VOL. 176 No. 3 AMERICAN MARCH, 1952

B 350934

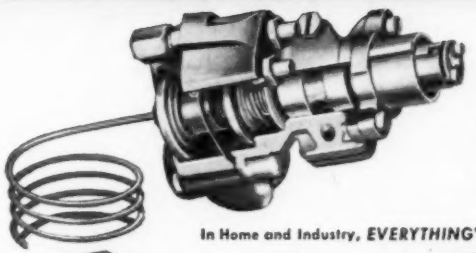
Gas Journal

THE LIBRARY OF CONGRESS SERIAL RECORD
APR 16 1952
DEPT

IT'S WHAT'S INSIDE THAT COUNTS

Inside every *Robertshaw* Model BJ Oven Heat Control are more than 51 uninterrupted years of heat control manufacture . . . extensive research and engineering facilities as well as specially designed automatic machinery . . . and most important of all, the priceless know-how gained in making more than 14 million units of a single type for a single purpose.

These are the qualities essential to large-volume manufacture of a sensitive, accurate thermostat with the rugged characteristics necessary to withstand years of daily use.



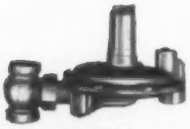
Robertshaw®
MODEL BJ
Oven Heat Control

In Home and Industry, *EVERYTHING'S UNDER CONTROL*

Robertshaw-Fulton
CONTROLS COMPANY • GREENSBURG, PENNSYLVANIA

Robertshaw Thermostat Division, Youngwood, Pennsylvania • Grayson Controls Division, Lynwood, California • Fulton Sylphon Division, Knoxville, Tennessee • American Thermometer Division, St. Louis, Missouri • Bridgeport Thermostat Division, Bridgeport, Connecticut.

FLOW INDICATING METERS



SERVICE REGULATOR—173

No. 0, 1 and 2 DOMESTIC METERS

No. 00 DOMESTIC METER

SERVICE REGULATOR—107

APPLIANCE REGULATORS —086

No. 2½, 3 and 4 CAST IRON METERS

ROCKWELL

You Can RELY ON ROCKWELL

ORIFICE METERS

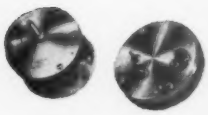
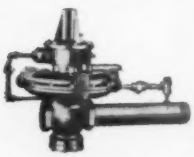
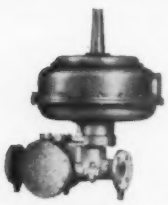


CHART DRIVES



"1001" REGULATORS

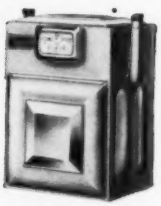


LOW PRESSURE BALANCED VALVE REGULATORS—014

ORIFICE CHART INTEGRATORS

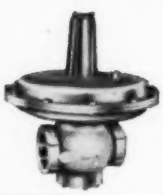
HIGH PRESSURE—015 PILOT LOADED REGULATORS

HIGH PRESSURE—015 INSTRUMENT CONTROLLED REGULATOR



5 LT. and 10 LT. TIN METERS

No. 4½ and 5 PRESSED STEEL METERS



INDUSTRIAL REGULTORS—120

HIGH PRESSURE—015 LEVER AND WEIGHT CONTROLLED REGULATORS

The ONE Source FOR ANY METER OR REGULATOR YOU NEED

Take advantage of selecting from the only complete line of meters and regulators in the industry. Then there will be no compromise on performance, no question as to the suitability of any unit to the service. Rockwell products are backed by continuous research—constant designing, testing, improving. Because of this you always get better performance and the best value in any Rockwell meter or regulator you buy.

ROCKWELL MANUFACTURING COMPANY

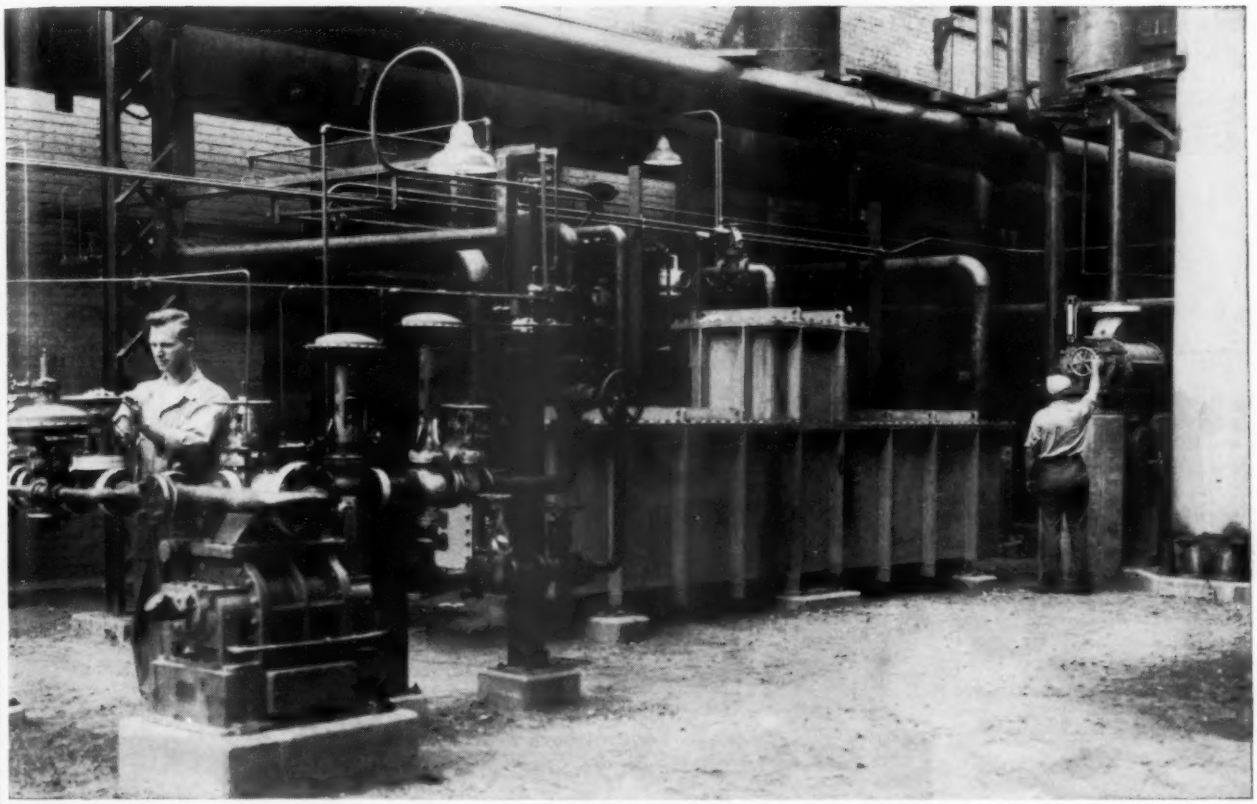
PITTSBURGH 8, PA.

Atlanta Boston Chicago Columbus Houston Kansas City
Los Angeles New York Pittsburgh San Francisco Seattle Tulsa

APR -8 1952

For standby service...for peak-load periods...

the Koppers-Hasche Furnace



The Koppers-Hasche Furnace pictured here is now in operation at an eastern utility.

THE Koppers-Hasche Reforming Process and Furnace are the result of 19 years of intensive experimental and development work. The Hasche Furnace is *unique in design*, being a thermal reforming process in which no free lampblack or carbon is produced. Gas is produced by passing a mixture of air and hydrocarbon feed stock continuously through a regenerative furnace.

For utility companies which distribute natural gas—for industrial plants which use natural gas—the Hasche Furnace is ideal for standby service. It is always ready to pinch hit in the event of temporary failure of the natural gas supply. This furnace is also valuable in helping utilities meet peak loads.

Here are some of the principal features of the Hasche Furnace:

INVESTMENT COST IS LOW. Extreme simplicity of process makes initial investment low, per unit of thermal output. Savings are effected not only on furnace cost, but also on auxiliaries. Unit is compact, requiring little ground space. Can be installed outdoors, saving cost of protective housing.

OPERATING COST IS LOW. Units are entirely automatic in operation, requiring minimum of operating labor and supervision. Few moving parts, thus reducing maintenance.

EFFICIENCY IS HIGH. Thermal efficiency is higher than any other gas-producing equipment, ranging upward of 98% with some types of gases.

GAS IS INTERCHANGEABLE. This furnace produces gas that is interchangeable with straight natural gas.

Feel free to write us for further information about the Koppers-Hasche Furnace. Your inquiry will receive prompt attention.

KOPPERS

KOPPERS COMPANY, INC.

Engineering and Construction Division, Pittsburgh 19, Pa.

AMERICAN GAS JOURNAL, March, 1952. Vol. 176, No. 3. Published monthly (except August, then semi-monthly), by American Gas Journal Inc., at 73 Main Street, Brattleboro, Vt. Entered as second class matter January 24, 1950, at the post office at Brattleboro, Vt. under Act of March 3, 1879. Executive and editorial offices at 205 East 42nd St., New York 17, New York. Subscription prices, U.S. $3 per year; Canada $4; Foreign $10. Single copies 50 cents, except August 15 issue which is not sold separately. Printed in U.S.A.

MUELLER®

CURB BOX

Easy

Easy TO INSTALL . . .

You'll save time when installing a Mueller Curb Box. It's easy to install . . . no complicated assemblies . . . no cutting to meet grade lines. Just place the box base over the Curb Stop and let it rest on the same foundation as the Foot Piece. Telescope upper section to grade line. That's all!

Easy TO MAINTAIN . . .

Settlement . . . frost heave . . . changing grade lines . . . are easily compensated for by a Mueller Curb Box. Telescoping design easily adjusts to any reasonable variation. Weight of vehicle or other heavy object is absorbed by telescoping design . . . not transmitted to service line or stop. Simple design. Rugged construction. No maintenance with Mueller Curb Boxes!

Close-up of the phosphur bronze spring which permits upper section to telescope freely, yet holds it firmly in any position.

Cut-away of base showing how Curb Box fits over and around Curb Stop. Write for Mueller Catalog 53.

1. **Easy** access through bronze bushed lid. Cast iron plug is tamper-proof because of recessed pentagon head.

2. **Easy** passage for shut-off assured by 2" inside diameter of upper section.

3. **Easy** telescoping sections for ease of installation and long life.

4. Heavy cast iron base fits over and around stop and pipe.

5. Centering foot piece optional, makes close-fitting support.

H-10317

Lengths (extended):
2 ft. — 2½ ft.
3 ft. — 3½ ft.
4 ft. — 4½ ft.
5 ft. — 5½ ft.
6 ft.

All lengths except 2 ft. telescope 9 in.

MUELLER CO.

Dependable Since 1857

MAIN OFFICE & FACTORY DECATUR, ILLINOIS

AMERICAN Gas Journal
ESTABLISHED 1859

VOLUME 176 MARCH 1952 NUMBER 3

This month...

"Apparently people are reading AMERICAN GAS JOURNAL," writes R. G. Barnett of Portland Gas & Coke Co. "Here are just a few who have requested a copy of our 'Guide Book' after reading your article (February 1952, page 26)." Our hope is that those who requested copies wont just be content with reading it. A little high-class plagiarizing, which we are sure Portland would condone, and any company that wanted to get a little closer to its own customers could turn out a similar job.

• • •

Several times, industrial gas men have suggested that we devote more space to industrial applications of gas, and we are glad to announce that we are doing just that. In February (page 16) and again this month (page 16) there are industrial utilization stories that are to be part of a series. We invite manufacturers and gas companies alike to send us in any leads on new, unusual or particularly well engineered installations. We agree with those who say this branch of industry operation deserves more attention, in keeping with its increasing importance to all industry.

• • •

Once more, we have been invited to urge our readers to comb through their scrap piles and turn loose of any iron or steel that has no reasonable likelihood of being put to use. There isn't much romance to selling a pile of junk, but it is essential to steel production, and steel production is essential to the gas business. *Q.E.D.*

• • •

We have sworn off mentioning JOURNAL circulation until we succeed in doubling our June 1949 starting figure. A rough count for March shows that we are up only 90.6 per cent. When we reach the 100 per cent goal we will probably write a short paragraph on the subject.

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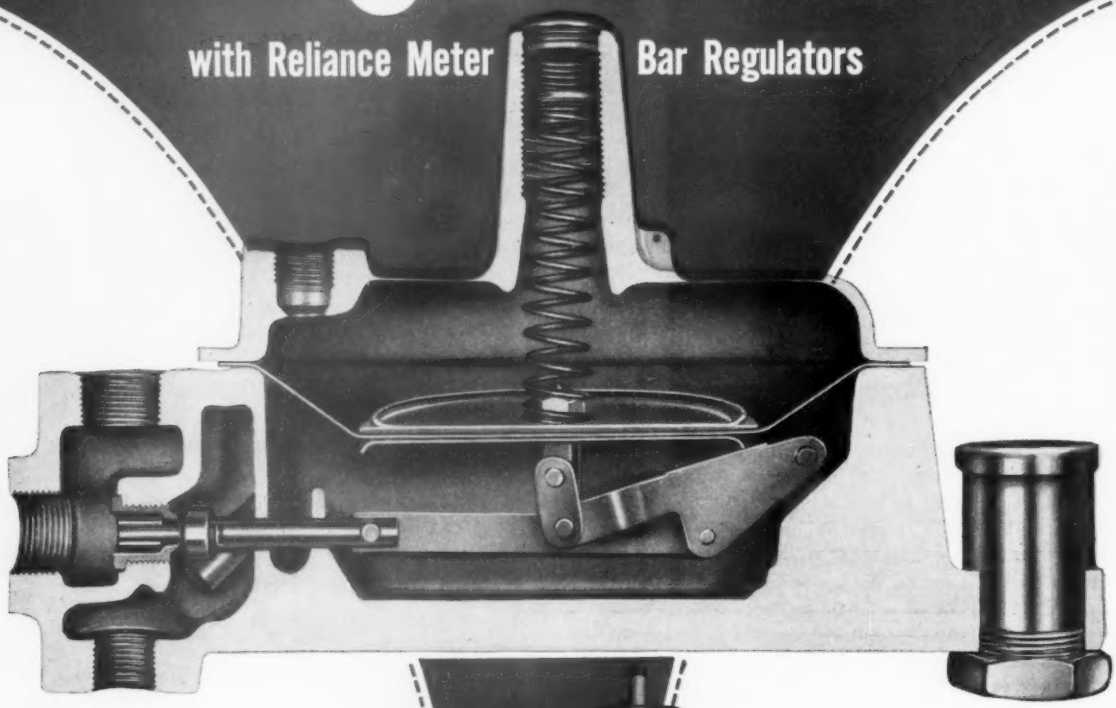
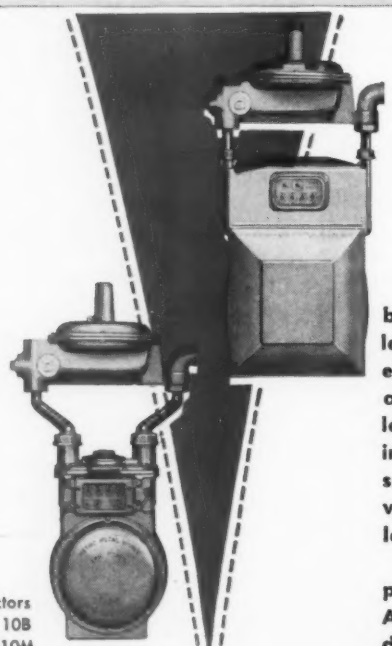
YOU SAVE 5 IMPORTANT WAYS

with Reliance Meter Bar Regulators



- **Save Fittings — Less Piping, Fewer Joints**
- **Save Installation and Service Time**
- **Save Capital — Lower Initial Investment**
- **Save Trouble from Piping Strains and Leaks**
- **Save Space**



Offset swivel connectors join regulators with 5B and 10B Ironcase or 10B and 10M Tinned Steelcase Meters.

Regulators attach to American Meter Company 5B or 5M Tinned Steelcase Meters by straight swivel connectors.

Type MH and MHR Regulators combine the field proven Reliance Type H Regulator with a meter bar, providing a compact, effective unit which conserves *space, capital* and *labor costs*. The regulators are particularly suited for house or service low pressure installations on intermediate and high pressure gas distribution systems. An inverted vent connecton is optional. Type MHR Regulator has a built-in mechanical relief valve.

Reliance Regulators are built with the precision and extreme care characteristic of American Meter Company's century-old tradition of *"Sustained Accuracy at Lower Cost."*

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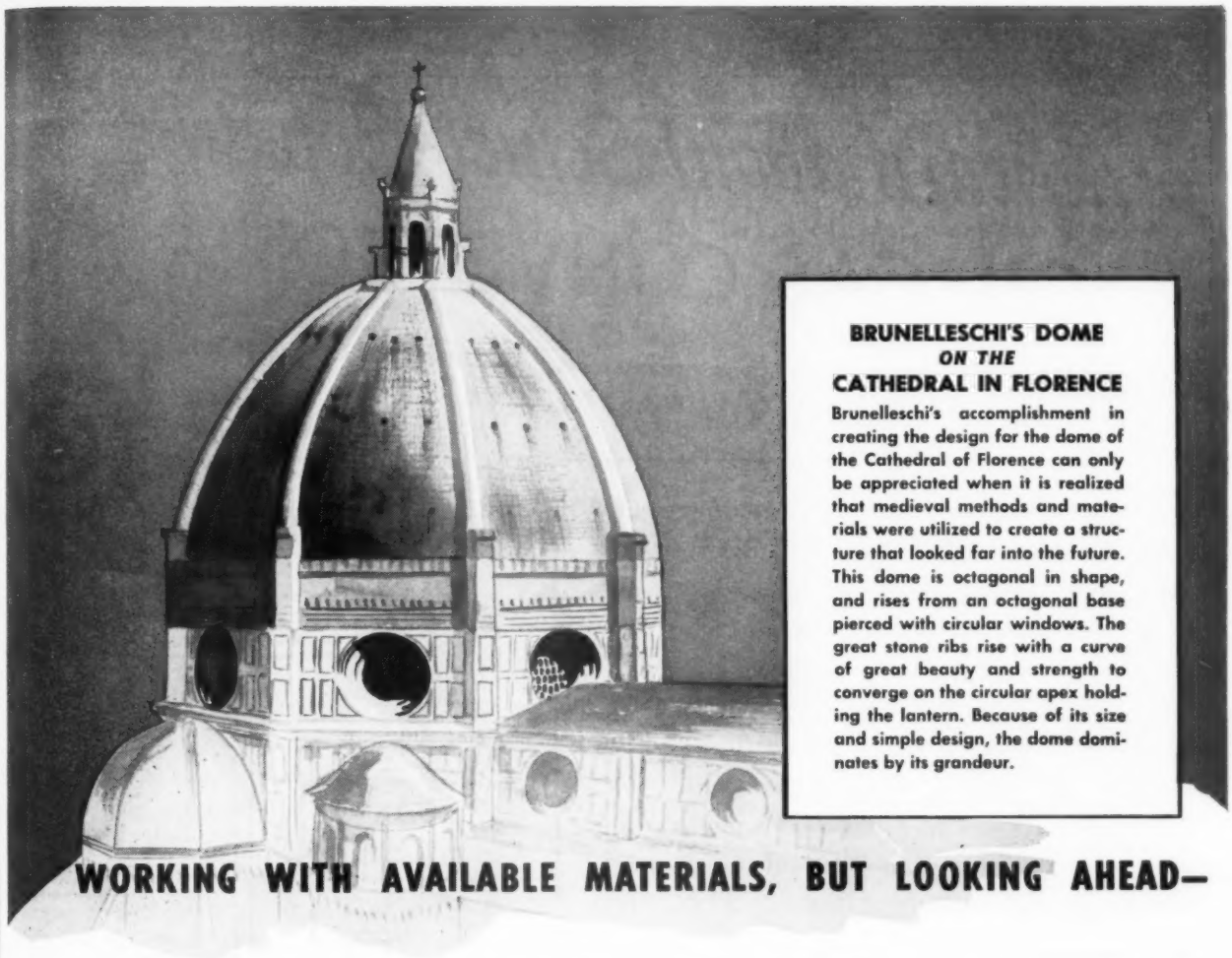
AMERICAN METER COMPANY — MEASUREMENT ENGINEERS

AMERICAN METER COMPANY
INCORPORATED ESTABLISHED 1836



BRUNELLESCHI'S DOME
ON THE
CATHEDRAL IN FLORENCE

Brunelleschi's accomplishment in creating the design for the dome of the Cathedral of Florence can only be appreciated when it is realized that medieval methods and materials were utilized to create a structure that looked far into the future. This dome is octagonal in shape, and rises from an octagonal base pierced with circular windows. The great stone ribs rise with a curve of great beauty and strength to converge on the circular apex holding the lantern. Because of its size and simple design, the dome dominates by its grandeur.

WORKING WITH AVAILABLE MATERIALS, BUT LOOKING AHEAD—

The various CAPTANS represent the best gas odorants currently available from the field of chemical industry. We are not bound by tradition or to any particular group of materials. We realize that uniformity, availability, and relative odor value must guide us in our search for improved gas odorants—but beyond that, we are not limited. Our only question on any material is whether or not its use will enable us to produce a better gas odorant.

Matching the excellence of the technical qualifications of the CAPTANS is the service that goes along with their use. It will pay you to request the aid of the CAPTAN Man. He will recommend the best and most economical system of gas odorization for your particular installation. Write or wire for his help today.

captan

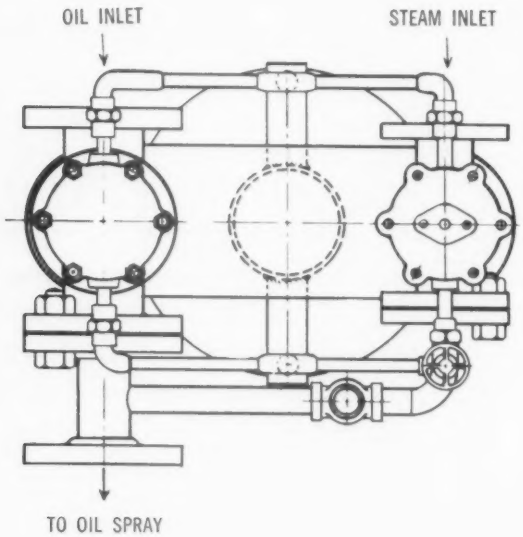
NATURAL GAS ODORIZING CO., INC.
P. O. BOX 1645 HOUSTON, TEXAS

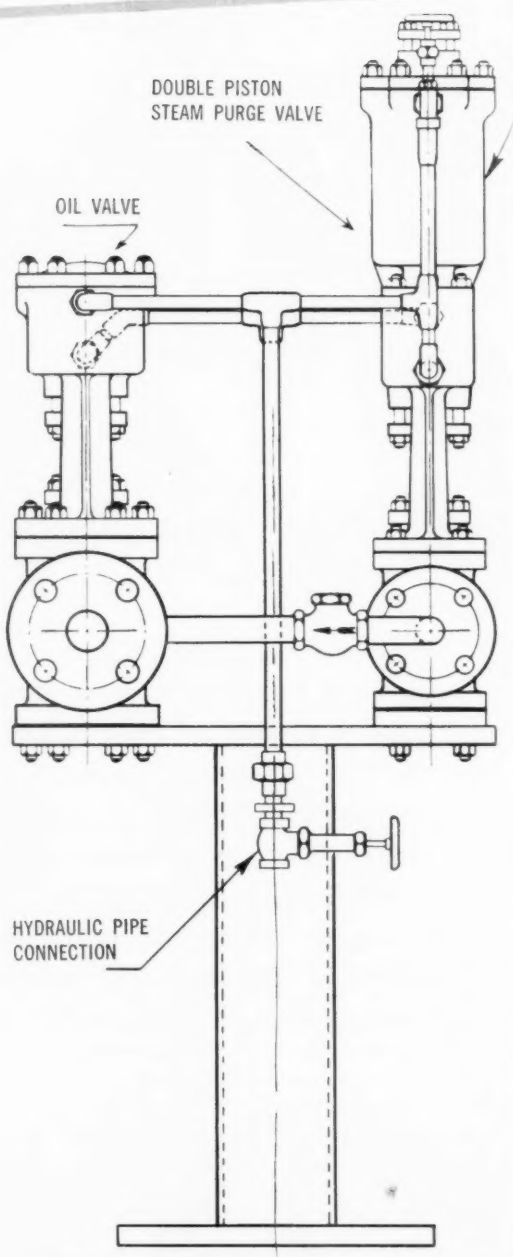
...heard about Semet-Solvay's OIL GAS CONVERSIONS?

They're the talk of the industry. 40 jobs are presently under construction or on order. This deserved popularity stems from the fact that these conversions are economical, will give long years of highly satisfactory service and are easy to operate.

The Semet-Solvay oil-steam purge unit shown here is just one of the features that contributes to the successful operation of our conversion jobs.

When the oil valve closes the double piston steam purge valve automatically purges out the oil spray, using a minimum quantity of steam.





SEMET-SOLVAY ENGINEERING DIVISION
40 RECTOR ST., NEW YORK 6, N.Y.
ALLIED CHEMICAL & DYE CORPORATION

"My dealers call it the water heater without headaches"

says R. D. Terhune,

Bryant, Paterson Branch Manager

If it's *net profit* you're interested in (and who isn't these days?), you've probably found that gross margins mean little when you have to call back and service the unit. That's one reason, perhaps the biggest reason, why Bryant Water Heater sales are up in my territory. Dealers know they can depend on Bryant—for good products, good profits, year after year. Householders, too, know Bryant—a big help in profitable selling. And what selling features you have: completely automatic operation . . . typical Bryant dependability . . . plenty of hot water . . . fast, easy temperature selection . . . cleanliness and economy . . . cathodic tank protection . . . all backed by a 10-year protection plan.

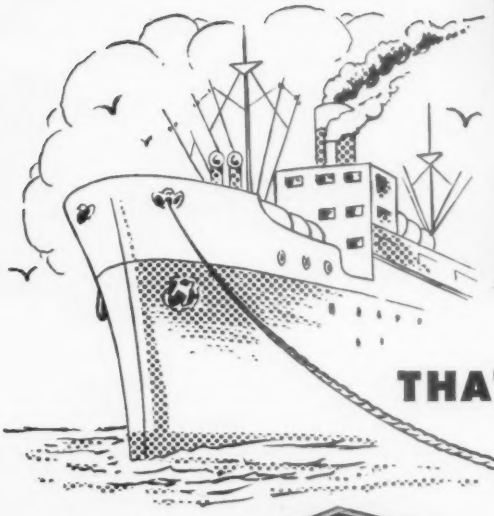
If you are now selling Bryant Water Heaters, you've probably been nodding "amen" after each of these statements. If you're not, and would like to make more money on water heaters, switch over to Bryant. Convince yourself! Your Bryant Distributor will be happy to help you, or, you can write Bryant Heater Division, Dept. 21, Affiliated Gas Equipment, Inc., 17825 St. Clair Ave., Cleveland 10, Ohio.

Bryant Model 115
Automatic Gas
Hot Water Heater

Made in 20, 30, 40 and 50-gallon capacities. Available for all gases. Features Grayson *Unitrol* with 100% Safety Pilot, extra-thick *Fiberglas* insulation, exclusive *Link-Trap* segmental baffle, *Protect-O-Rod* Magnesium-alloy anode. Backed by 10-year protection plan.

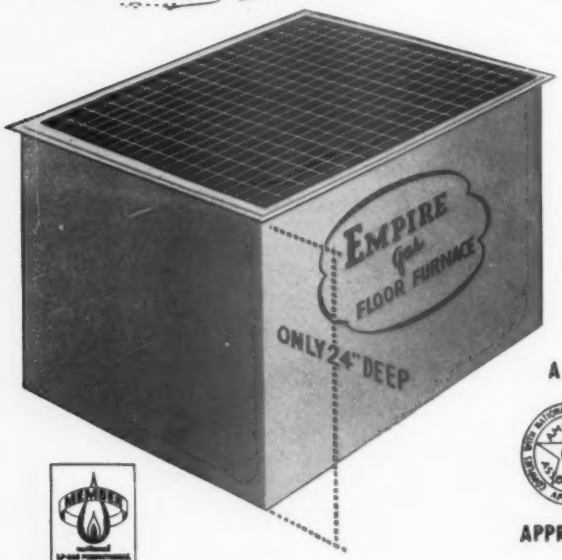
bryant *best buy*

IN HEATING,
AIR CONDITIONING,
WATER HEATING



Tie up

WITH A LINE
THAT MEANS BUSINESS



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Gas

FLOOR FURNACES

Mean....

- Increased Sales
- Greater Profits
- Satisfied Customers

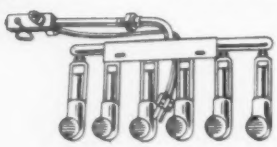
AGA APPROVED

The *Empire* Line offers...

Low initial cost
Economy of operation
Minimum service calls
Controlled comfort
Ease of operation
Dependability of fuel
Safety of operation
Long life of appliance

EXCLUSIVE WITH EMPIRE

The FAMED *"Thriftmatic"* *Gas* BURNER



All Models are Available for Use with Either Natural, Mixed, Manufactured, or L-P Gase:

EMPIRE STOVE COMPANY
BELLEVILLE, ILLINOIS
WORLD'S LARGEST MANUFACTURER OF *Gas* FLOOR FURNACES

SAW CONCRETE ....

OR ASPHALT

with CLIPPER CONCRETE SAWS

THIS FAST-EASY ECONOMICAL WAY!

NOW SAW . . . BEFORE BREAKING! On patches and trenches the removal costs are reduced more than 25% and replacement material is poured to straight, smooth edges. A sawed cut made ¼ the slab depth provides a perfect plane of weakness for fast breaking and removal.

Patches . . .

Eliminate spalling and fractures around repair patches by sawing before breaking. Saw clean, straight lines, break smooth, then patch perfectly in building floors, runways, drives, etc.

Trenches . . .

Gas, Water, Electric, Sewer, Telephone . . . wherever new lines are installed or old ones repaired. Saw trenches . . . any width . . . then break out to straight, smooth edges — no fractures beyond removal lines.

Contraction Joints . . .

Saw contraction joints in continuously poured slabs and eliminate costly hand forming and usual spalling. Building floors, highways, streets, runways, walks, etc. can all be sawed.

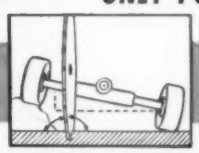
MODEL C-130

One of FIVE MODELS
Gas or Electric Power

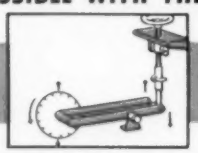
Free Trial . . .

You can TEST—actually TRY a Clipper Concrete Saw on YOUR Job without obligation! Write for details! . . . by the Originators of Masonry Saws.

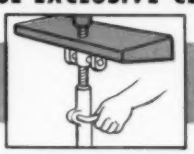
MAXIMUM ECONOMY IN CONCRETE CUTTING ONLY POSSIBLE WITH THESE EXCLUSIVE CLIPPER FEATURES



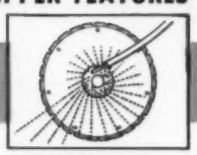
1. Clipper "No Bind" Floating Three Point Suspension Automatically protects blade



2. Positive Screw Feed Instant control raises or lowers blade smooth, easy



3. Adjustable Depth Lock Set this handy stop for whatever depth desired.



4. Patented Spray Control Its value is measured in increased Blade Life.

Clipper

KANSAS CITY 8, MISSOURI

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ST. LOUIS
CLEVELAND
INDIANAPOLIS
DETROIT
HOUSTON
AUSTIN, TEX.
CHICAGO
LOS ANGELES

PHILADELPHIA
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DRY-WET & B-R BLADES

DIAMOND BLADES

MAIL THE COUPON TODAY!

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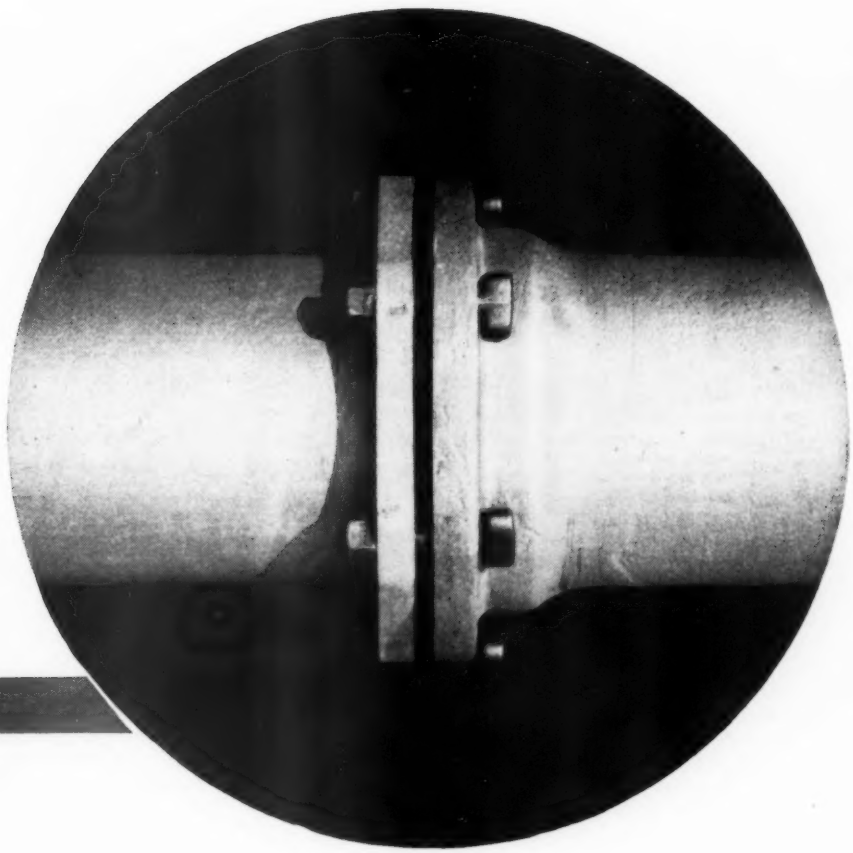
When you say that a gas main has long life and bottle-tight joints, you say it all. Gas mains installed a century or more ago, and still in use, prove that cast iron pipe has *long life.* They also testify to the serviceability of the bell-and-spigot joint. Mechanical joint cast iron pipe, installed over the past quarter-century, proves that mechanical joints are *bottle-tight* for all types of gas and at high pressures. Mechanical joint cast iron pipe has certain other advantages. More footage can be laid per day with minimum equipment—with less delays in wet weather and less difficulty with wet trenches—and with lower labor cost. Cast Iron Pipe Research Assn., T. F. Wolfe, Managing Director, Peoples Gas Bldg., Chicago 3.

● Unretouched photograph of a cast iron gas main installed over a century ago by Hartford Gas Company, Hartford, Conn.

CAST IRON ®

● Many important gas utilities have standardized on standardized mechanical joint cast iron pipe for all types of gas at low, intermediate and high pressures.



STANDARDIZE ON

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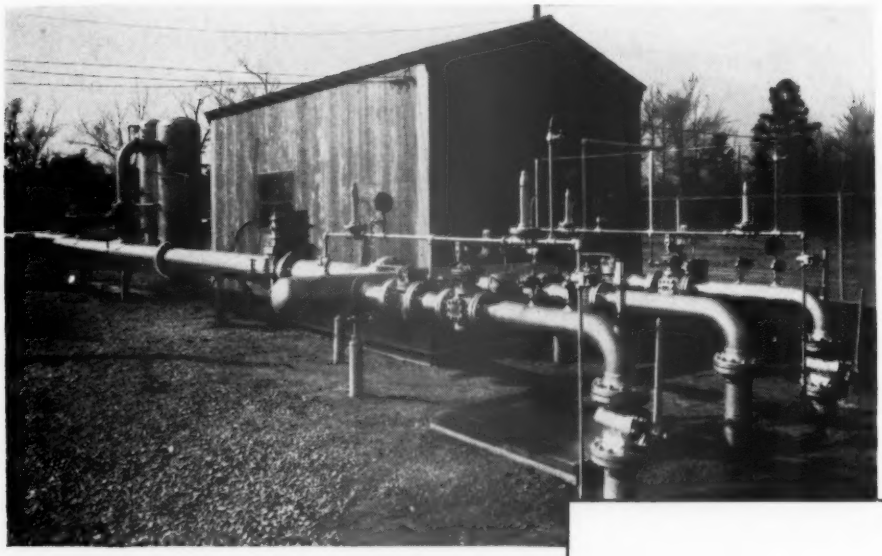
STANDARDIZED MECHANICAL JOINT

PIPE

THE RIGHT COMBINATION

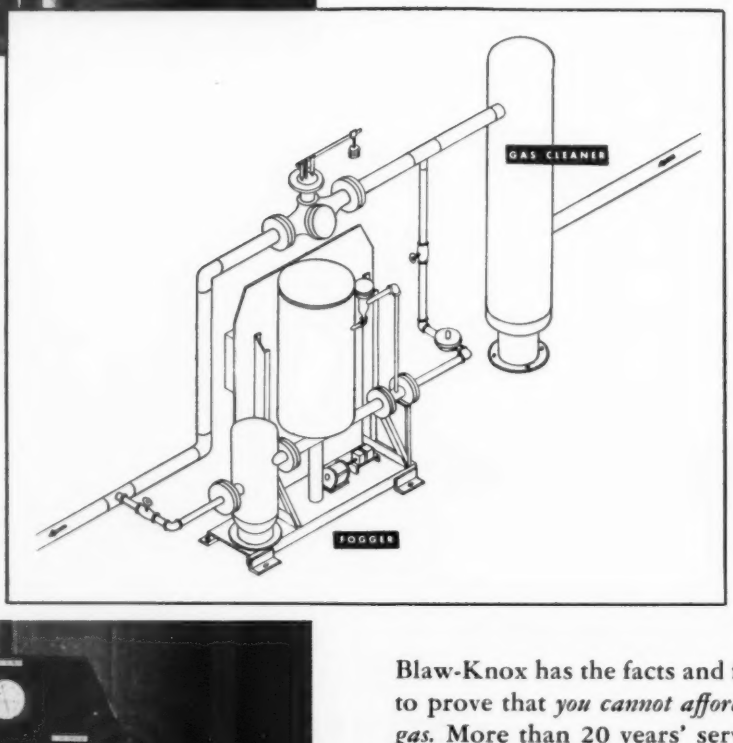


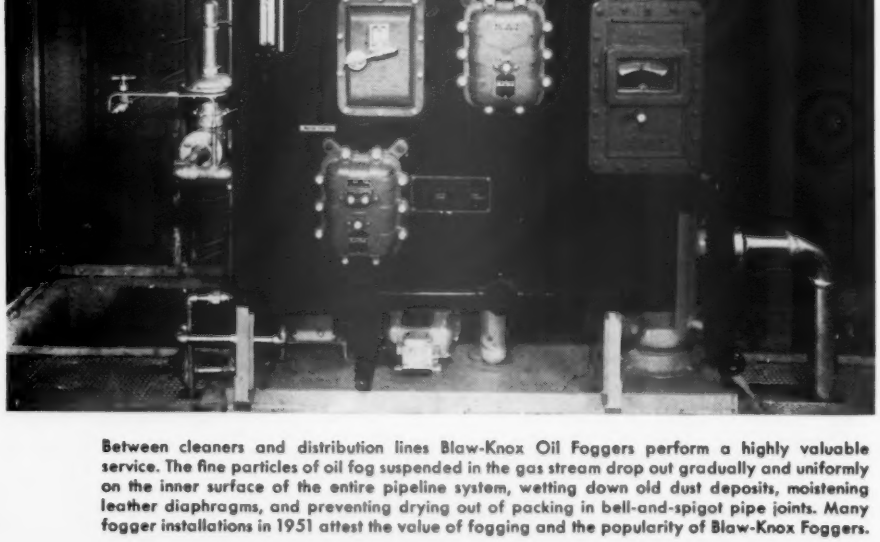
BLAW-KNOX GAS CLEANER PLUS OIL FOGGER

▲ A typical City Gate or Town Border Station. Here, gas from the transmission main gets a scrubbing in the Blaw-Knox Gas Cleaner which removes *all* traces of dust, scale, and rust. No new dust gets into your distribution system.

• • •

The diagram shows the *Right Combination* to insure delivery of clean, conditioned gas. Both Cleaners and Foggers are standardized units—quickly installed and requiring the minimum of maintenance or supervision. ▶





Between cleaners and distribution lines Blaw-Knox Oil Foggers perform a highly valuable service. The fine particles of oil fog suspended in the gas stream drop out gradually and uniformly on the inner surface of the entire pipeline system, wetting down old dust deposits, moistening leather diaphragms, and preventing drying out of packing in bell-and-spigot pipe joints. Many fogger installations in 1951 attest the value of fogging and the popularity of Blaw-Knox Foggers.

Blaw-Knox has the facts and figu
to prove that *you cannot afford d*
gas. More than 20 years' service
the gas industry, plus continu
research, show conclusively t
operating and maintenance exper
due to pipeline dust cost more t
the installation of Blaw-Knox
Cleaners and Foggers.

For interesting and convincing
on this important subject, write
our latest Bulletin—No. 2353.

GAS EQUIPMENT DEPARTME
BLAW-KNOX DIVISIO
OF BLAW-KNOX COMPA
2061 Farmers Bank Building
Pittsburgh 22, Pa.

Editorial:

No Moses In Sight

AT FIRST BLUSH it might seem that the gas industry is coming in for some favorable publicity, with a twelve-page feature story "Boom in Natural Gas" in the March 10 issue of *Life*, and a similar feature in the Financial Section of *The New York Times*, starting the same day.

These stories, dealing largely with the spectacular expansion of natural gas transmission in the past ten years, are devoted almost entirely to the pipeline companies and the billions of dollars invested in them.

It is encouraging for the industry to see itself thus pictured as a phenomenon of latter-day industrial expansion; but there must be in it grounds for sobering reflection to the gas distributing utilities who are in the difficult position of being responsible for the ultimate delivery of most of this gas, yet under circumstances over which they have little or no control.

Feature writers on natural gas like to toss off the gross figures—reserves in the ground, billions of dollars invested, miles of pipeline, and similar spectaculars. But after all of the cheers have faded down, and the gas transmission operators have taken their bows, either as heroes or villains in the piece, depending on the reporter's own whim, the distributing gas companies know that their job has only begun.

They know that natural gas in Texas or Louisiana isn't natural gas in Pennsylvania or New England. And they know that the annual carrying capacity of a pipeline has all-too-remote a relationship to the requirements of unexpectedly heavy degree-days in a locality where natural gas heating has been embraced by the public. They know, in short, that no matter how glamorous the story of natural gas transmission may appear in print, it is still up to the old-time gas companies to keep their customers properly fueled in times of emergency and shortage, just as well as in offpeak days.

In practically every instance, the introduction of natural gas has resulted in operating savings, and some companies have been pulled out of the red ink in a single year just because they were able to buy the gas cheaper per therm than they could ever hope to make it. But even this has been far from unalloyed bliss. Cheaper gas means rate reductions, and rate-reductions mean an expansion of the high-peak heating load at a rate that gas utilities are often hard put to cope with. Load building, once the paramount problem of the manufactured gas companies, now gives way to the problem of load balancing, and unless that is solved along with load building, natural gas can well prove to be a doubtful boon.

The cooking load, backbone of all load balancers, is hard pressed by the electric industry.

The Wall Street Journal recently whipped up a tasty treat for its cutaway coat-and-bowler hat clientele in the form of a byline story that practically relegated gas cooking to oblivion. Quoting a Hotpoint range official, the reporter said (and, by implication, warmly endorsed) "the transition to electric cooking from gas is just as inevitable as the shift from gas to electric lighting."

It is unfortunate that the staff correspondent of this financial oracle made it easy on himself by merely going to electric range spokesmen for most of his facts and all of his opinions.

The entry of former gas range manufacturers into the market with electric models was pictured as little less than a stampede away from gas cookery. "One of the nation's largest gas range producers is now climbing aboard the electric bandwagon . . . a dozen others that have concentrated on gas are bringing out new electric lines." Gas is dismissed as having only a lingering latent hold on the public fancy because it is cheaper and "gas men say that their product yields quicker heat."

The publication of this unfair and biased presentation of only one side of a complex competitive picture does the cause of gas cooking great harm. It contributes to the myth, fostered by the electrical industry, that cleanliness, automatic operation and general class are exclusive attributes of the electric range.

This is a sobering picture for the gas industry, for it means that no matter how good gas cooking promotion has been, it still hasn't been good enough. It is somber for the gas range manufacturer, too, if he wants to stay in the gas range business; although he can always switch his allegiance to electricity if he wants to.

There is no such escape hatch for the gas company. That is why merchandising leadership must be taken and carried on by the gas utilities. It must be done by every company maintaining the sales force necessary to actually push appliances. It must be done by company and industry promotions in which all participate to the maximum.

Despite contrary claims gas has an overwhelming public acceptance. If its champions have the imagination and the will to sell it aggressively for all uses, they can reverse any trend, real or fancied, toward electric cooking.

But there is no Moses in sight to lead the industry into the promised land. The natural gas transmission companies won't do it; they can sell more gas than they can transport. The manufacturers of appliances don't have to; they can go into the building of electrical equipment overnight, as many already have.

It leaves the distributing gas utilities to do the job. That's the way it's always been and always will be.

Elliott Taylor

Is Cathodic Protection Justifie

by Marshall E. Parker
Consulting Corrosion Engineer

THE QUESTION is often asked, "Is cathodic protection justified on lines which have been laid with a really first-class coating job?" Corrosion engineers answer this in the affirmative, if the soil traversed is even mildly corrosive.

There are two excellent reasons for this recommendation. It is assumed, throughout this discussion, that the line in question lies in soil of sufficiently corrosive characteristics that a bare line laid therein would either experience leaks within a period of, say, fifteen years, or after being in the ground for that length of time, would be corroded enough to have materially lost in salvage value. A soil less aggressive than this does not even justify coating in the first place; but it is difficult to be even reasonably sure in advance that a soil is actually as non-corrosive as this. It is further assumed that the coating under discussion is one of the best—not only in its inherent characteristics, but in the quality of its application. Coatings of lesser quality quite obviously require the additional protection afforded by cathodic protection.

Insurance against the unknown

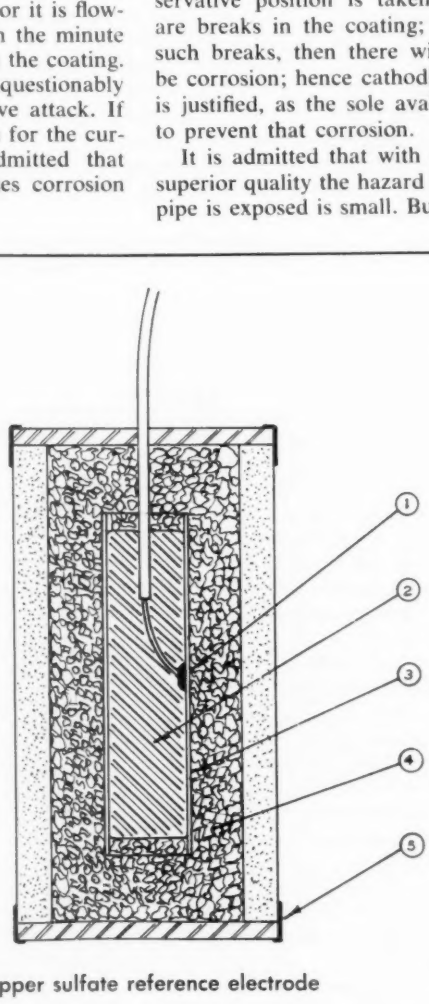
The two reasons already alluded to are, in brief: first, the very best coatings applicable to pipe lines are something less than perfect, and cathodic protection is relatively inexpensive insurance against damage at the unknown imperfections; second, the best of coatings deteriorate with the passage of time, both by the natural forces brought to bear against them underground, and by accidental damage—and there is no faster nor more positive method of detecting coating deterioration than by the behavior of an applied cathodic protection system.

That no coating is perfect is easily believed by those who have had occasion to make conductivity tests or to conduct tests for the determination of the current requirements of lines for cathodic protection. The conductivity is always a positive value; it is never zero. Also, a certain amount of current is always required to alter the potential of a pipe line with respect to the earth. If the coating were in effect an absolutely perfect insulator, then (for direct current) a potential difference could be established between the pipe line and some other contact with the earth without the flow of current, except for an initial flow needed to charge the condenser which would be formed. In other words, if a potential is applied between an external electrode and the pipe, there is a definite flow of current. This current, then, is either flowing through the coating itself, as a conducting substance, or it is flowing through the moisture in the minute cracks and imperfections in the coating. If the latter is true, then unquestionably there will be some corrosive attack. If the former is the sole route for the current, then it must be admitted that whether such current causes corrosion simply is not known.

Coating breaks to be assumed

However—and this is important—it is not possible to *know* that no current can flow electrolytically to the pipe through imperfections in the coating. To be sure of this, to be positive that conductive coating is a sufficient explanation of the current flow, is impossible. It must therefore be assumed, if a conservative position is taken, that there are breaks in the coating; if there are such breaks, then there will inevitably be corrosion; hence cathodic protection is justified, as the sole available means to prevent that corrosion.

It is admitted that with coating of a superior quality the hazard to which the pipe is exposed is small. But the cost to



Copper sulfate reference electrode

1—Solder #12 plastic insulated wire to inside of copper tube near center.
2—Prime inside of tube and fill with asphalt or tar.
3—Pickle copper tube with nitric acid; wash with distilled water.
4—Center in section of unglazed clay tile; pack with copper sulfate crystals; fill with saturated copper sulfate solution.
5—Close ends with micarta discs and seal with electrician's polyethylene tape.

Lines with Superior Coating?

protect against it is also small. For protection against a large hazard, a large premium must be paid; for protection against a small hazard, a small premium.

Short-term tests insufficient

The second reason for the application of cathodic protection to a well-coated line is perhaps more compelling that the first. The accepted methods of measuring the quality of coating in place, although they vary considerably in detail, are all based upon placing the line under partial or complete cathodic protection, and determining the amount of current required to accomplish this. It is well recognized that the process of polarization is of fundamental importance on all electrochemical processes, including corrosion and cathodic protection. This is to say that the true electrochemical behavior of a coated pipe line is something which cannot be determined fully by a short term experiment; only by allowing sufficient time for polarization to become complete—which may require several weeks—or to progress far enough to establish a recognizable trend, can the whole story be told.

A significant conclusion

From these considerations the conclusion may be drawn that there is no form of coating test quite so complete, so reliable, as a cathodic protection system in continuous operation. Not only does such a system yield results which are undeniably based upon adequate polarization, but its very continuity of operation makes it possible for it to serve as a sentinel, standing perpetual watch, and able at the same time to give notice of gradually deteriorating coating and of sudden damage of serious extent.

This notice is given by a change in the electrical quantities involved in the cathodic protection circuit. If no other change takes place except that of increased coating conductivity, there will be a drop in the pipe-to-soil potential, and usually an increase in the current output of the unit supplying the protection, whether this be a rectifier or a set of galvanic anodes. If, however, there is excessive drying out of the ground, there may be a drop in the current output and a simultaneous drop in the pipe-to-soil potential. Failure of one or more protective units, as occasioned by power failure or severed wires will of course be indicated by a drop or complete loss of current output, and a drop in pipe-to-soil potentials. Thus it is seen that the various changes which interfere with protection may result in a change in current output in either direction, but that the inevitable result of any loss of protection is a drop in pipe-to-soil potential. This must naturally be the case, since protection is actually defined in terms of this potential.

Periodic surveys reveal deficiencies

Periodic surveys of pipe-to-soil potential conducted along the line will disclose any type of deficiency in protection. The exact nature and location of the trouble may require additional investigation, but if earlier surveys have been properly recorded, the task of tracing down the source by comparison is relatively simple. These periodic surveys need not be complete; if readings are taken at locations of lowest potentials, as shown by earlier surveys, and if these values are satisfactory, then nothing more need be done. Only when inadequate potentials are encountered is there any need for closer spacing on the readings.

Lines protected by rectifiers should be checked at each unit—for both current and potential—and at the previously determined low point between units, or some more accessible location not too far distant from the point of minimum potential. Those under protection with galvanic anodes require essentially the same readings, but the smaller size and greater number of units obviously require a larger number of readings. In the event that potentials below the satisfactory level (usually considered to be 0.85 volt, referred to a copper/copper sulfate electrode) are found, the process of locating the fault will be facilitated by plotting the potentials on a chart, along with those obtained in previous surveys. Often even more significant indications are obtained if the differences between the sets of values from two different surveys are plotted.

Monthly ammeter-voltmeter readings

The ammeter and voltmeter on each rectifier should be read at least once a month. If the location is convenient, as when installed at a station, they should be read oftener. So long as these values do not depart materially from values which have been established as normal, there is no need for any further investigation at intervals shorter than about once a year. Galvanic anode installations are not so easily monitored, but there should be a survey thorough enough to detect major changes at least annually.

The reference electrode

Since the pipe-to-soil potential itself is the final answer to the question of adequate protection, a system based upon this quantity will give the most reliable monitoring of a line. A point, or set of points, is selected along the line, at locations relatively remote from protection units, but where company personnel is present at frequent intervals—preferably daily. At each of these points, a connection is made to the line, and a permanent copper/copper sulfate electrode is buried a few feet from the line. This electrode should be set at a depth sufficient to assure permanent moisture. Between the electrode and the line a high-resistance voltmeter is connected. For this service, it is not necessary to have an instrument of laboratory precision or sensitivity. The reading of this instrument will then be indicative of the pipe-to-soil potential, and any deviation will be readily observable.

The electrode may be constructed by placing a piece of copper tubing within a length of *unglazed* clay tile, the ends being closed with discs of micarta or similar material, and sealed with polyethylene tape. The tile is filled before burial with a saturated solution of copper sulfate, with a large excess of undissolved crystals. Care should be taken that no metal contacts the solution except copper—the method of attaching the lead is shown in the figure. If buried in low resistivity soil, such an electrode will have a very low resistance, and the reading obtained on a medium high resistance meter will be very close to the true potential. Even a low resistance meter could be used, except for two objections. First, the copper sulfate will tend to polarize if it carries a current in excess of about twenty microamperes per

(Continued on page 42)

Industrial Application

Roofing Felt Production Is Increased

by Evereth L. Lyons
General Production Manager
American Asphalt Roof Corporation

THE RATE OF DRYING roofing felt continuously, as an operation directly after the paper web comes out of the paper making machine in preparation for asphalt impregnation, has been speeded twelve to fifteen per cent by the addition of open combustion gas equipment and gas-heated air to the long established steam drying drums.

The web usually leaves the paper making machine made up of water, 65 per cent of weight, and solids, 35 per cent. The web, a continuous strip of the felt that will be trimmed to 72″ wide and rolled, must have its water content reduced to 3.5-4.5 per cent before asphalt impregnation. Water content of five per cent or more causes difficulties in the impregnating process and also causes excessive shrinkage which cannot be tolerated.

Briefly, the travel of the web in the drying process is from the Fourdrinier paper making machine, between two press rolls, around a series of large-diameter steam heated drums to the reel for rolling prior to hot asphalting.

More production depended on drying

The urgent problem of getting greater production of roofing felt and three-in-one mineral surfaced shingles depended most heavily on getting faster drying. In general, a duplicate drum-drying line or additional drums were not economical considerations. The line has a large number of these drying drums and their cost and the installation cost are substantial. Also, there are complex mechanical considerations with respect to coupling additional drying equipment with the Fourdrinier machine.

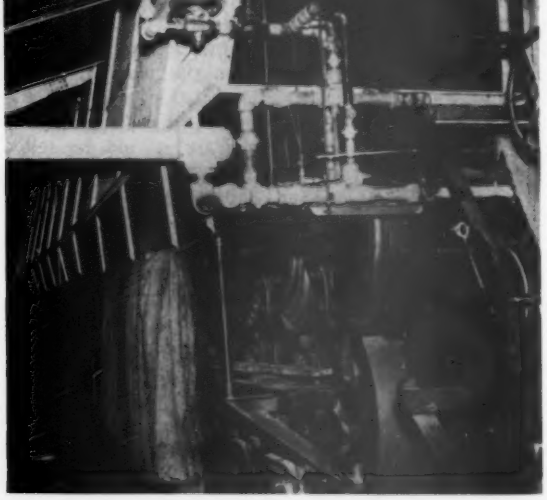
Supplementary, fast drying facilities that would operate in conjunction with the steam drums were clearly the most advantageous solution, all things considered.

Two drying media, both using gas, were added without significant changes in the massive structure of the steam drum line. Line-type radiant gas burners were installed to fire directly on the moving web and hot air was forced to the web from nozzles arranged between the steam heated drums.

Burning the natural gas supplied to our Fort Worth, Tex., plant, nine of the Red Ray Manufacturing Company's 77″-long burners are firing in the open and directly on the web; four of their

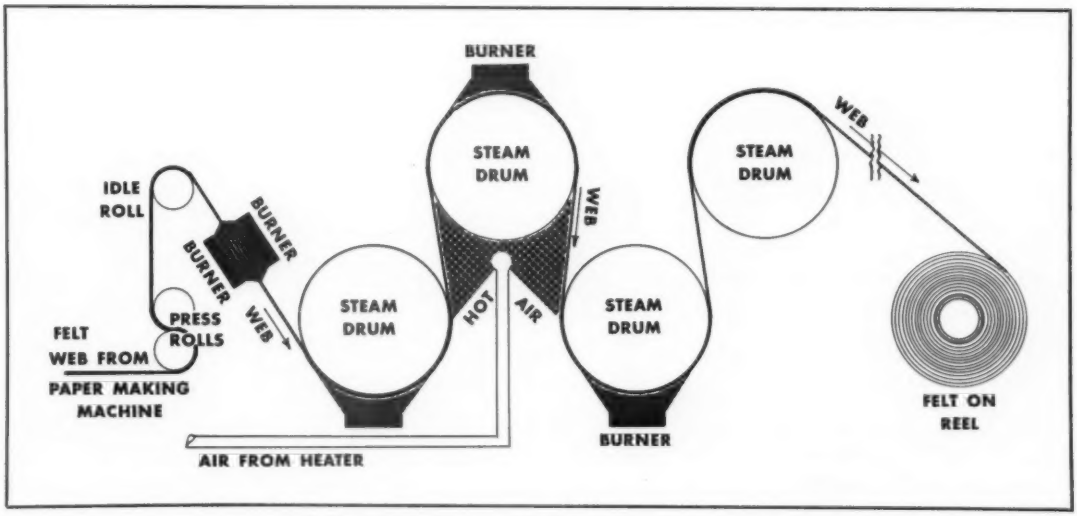
A close view of the burners, venturi inspirators and piping, with the wet web passing directly between two burners.

Photos: Red Ray Manufacturing Company, Inc.



A section of the drying line in American Asphalt Roof Corporation's plant, Fort Worth, Tex. The web, entering line over an idling roll at the extreme right, with gas burners firing above and below.

y Adding Gas Drying Equipment



Simplified diagram of typical paper web travel from the Fourdrinier paper making machine, through press rolls and around a series of steam heated drums that have been supplemented by the indicated gas burners and forced air.

burners heat the air that is forced to the web among the drums. This combustion system consumes about 6,800 cubic feet of gas per hour.

Burners operate at 2,600° F

The burners are constructed so that the flame length is contained within the refractory shape. The burners, in a glowing state at approximately 2,600° F, transmit radiant heat and products of combustion to the web itself for rapid drying action.

Primary air for combustion is venturi-inspirated, one inspirator on each burner, with air supplied by a centrifugal compressor. In this system there are no explosive or combustible gas-air mixtures in the pipes to the burners.

Critical combustion conditions, for such considerations as process atmosphere, are not necessary so secondary air from the room can be ignored. For our purposes, combustion is complete at least to the point that products of combustion do not effect the web in any way that impairs the subsequent asphalt impregnating process.

Each burner increased drying speed

Carefully conducted tests have included evaluation of the results of the installation of the Red Ray equipment in terms of production tonnage. For each of the 77″ burners, production was increased between three-quarters and one ton per 24-hour period. The exact production increase depends upon the weight of the felt that is being run.

The gauge range of the felt dried in this equipment is between 26 and 85. The numbers are thousandths of an inch. The speeds at which the equipment is operated varies, according to the felt gauge, from 110 to 200 feet per minute.

Evaporation from the web is unrestricted and temperatures within the paper itself are well-below the danger point. Accordingly, there have not been any difficulties with either web-burning or scorching.

The installation of supplementary open-fired gas equipment is a departure from the rather general practice of relying entirely upon the drying action of steam heated drums in the production of roofing felt. The change was made in accordance with a company policy to utilize developments that will improve our production and the product we sell.

Below, a close view shows the manner of supplementing the steam drying drums with gas burners placed close to the web.

Utilities Drop Month's Gain in Two Da

by John F. Falvey

Financial Editor

INVESTORS adopted a "Stop, Look and Listen" attitude toward stocks in the latter part of February, and the result was a loss, in two short days, of all the market gains tortuously built up by industrial shares since the low point reached early last December. Utility shares, like the railroad equities, surrendered one month's gains.

Despite the shakeout, it is significant that average yields on all of the groups comprising the AMERICAN GAS JOURNAL index, at the low point of February 20, were only slightly higher than in January. With the exception of the natural gas transmission and distribution company group, the return afforded at present dividend rates was the lowest for a number of months.

With the jitters momentary, the utility shares in succeeding market sessions recovered a sizable proportion of the ground previously surrendered. But the situation will continue to require considerable watching lest the cracks starting to develop in our economic armor should widen.

The drop in share prices should not have come as a surprise to many, because prior to it an increasing number of market followers had taken to the sidelines on the assumption that quotations had reached a high level in relation to immediately discernible prospects. The likelihood of further gains, they had reasoned, was not worth the risk entailed.

Yield impelling stock purchases

Yield return, rather than promise of capital appreciation, recently has become the impelling factor in stock purchases. While many investment firms lean to the belief that most companies will be as generous in their dividend distributions as heretofore, it should be noted [AMERICAN GAS JOURNAL, January 1952] that corporate dividends in recent months have dropped below the year earlier level. For December 1951, the latest for which data is available at this writing, the decline was sixteen per cent from December 1950. The drop in distributions in the closing month brought total dividends for 1951 to a point only two per cent above 1950, after having shown constant year-to-year increases in early 1951 months.

While the decline in dividends in closing months of 1951 was due chiefly to reduction and/or elimination of year-end or "extra" disbursements, an increasing number of dividends have become victims, during 1952, of a drop in corporate profits.

More pressure on earnings expected

It seems certain, at the moment, that mounting pressure on industrial company earnings will be witnessed during the months ahead, as corporations face rising costs and taxes while having to utilize cash resources and dig themselves deeper into debt to raise cash required for new facilities and to pay much heavier than normal taxes in the first half of the year.

These factors combine with the increasing proportion of less profitable war business in the economy to suggest that dividends may be under increasingly heavy pressure as the year progresses.

The stock market as a whole had moved to within less than four per cent of its high of the past twenty years in the face of declining corporate earnings, only to give ground sharply as cut-backs and eliminations of dividends were being effected. Action of the market from this point forward will be hinged very closely to the level of dividend distributions. Any further decline in payments

Index of Yields : Selected Utilities Stocks

	Feb. 1952	Jan. 1952	Dec. 1951	Nov. 1951	Oct. 1951	Sept. 1951	Aug. 1951	July 1951	June 1951	May 1951	Apr. 1951	Mar. 1951
Natural Gas Transmission Companies	4.36%	4.32%	4.50%	4.51%	4.67%	4.67%	4.65%	5.07%	5.26%	5.35%	5.22%	5.38%
Natural Gas Transmission & Distribution Companies	5.29	5.17	5.33	5.30	5.36	5.09	5.11	5.24	5.30	5.45	5.43	5.35
Manufactured & Mixed Gas Companies	5.18	5.05	5.25	5.36	5.32	5.43	5.46	5.52	5.22	5.35	5.23	5.22
Class "A" Electric Companies	5.61	5.53	5.80	5.78	5.83	5.74	5.69	5.97	5.95	5.88	5.52	5.49
Class "B" Electric Companies	5.70	5.64	5.76	5.82	5.78	5.74	5.78	5.86	5.88	5.94	5.72	5.66

Method of Compiling Index of Yields

This is a straight arithmetical index of comparative yields obtainable on a selected group of gas and electric utility industry common stocks.

The companies comprising this index have been selected by the AMERICAN GAS JOURNAL as providing a representative cross-section of each industry, from the standpoint of geographical diversification and of the relative importance of the individual companies in their areas.

No effort has been made to weight the average to give effect to changes in capitalization or in dividend rates because the yields afforded on the issues reflect such changes. The index is designed to show the rate of return and not necessarily market movements on the stocks comprising it.

The companies used in compiling this index are:

Natural Gas Transmission Companies: El Paso Natural Gas Co.; Northern Natural Gas Co.; Panhandle Eastern Pipe Line Co.; Southern Natural Gas Co.; Tennessee Gas Transmission Co.

Natural Gas Transmission and Distribution Companies: Columbia Gas System, Inc.; Consolidated Natural Gas Co.; Lone Star Gas Co.; Oklahoma Natural Gas Co.; Pacific Lighting Corp.

Manufactured and Mixed Gas Companies: Bridgeport Gas Light Co.; Brooklyn Union Gas Co.; United Gas Improvement Co.; Peoples Gas Light & Coke Co.

Class "A" Electric Companies: Boston Edison Co.; Commonwealth Edison Co.; Houston Lighting & Power Co.; Southern California Edison Co., Ltd.

Class "B" Electric Companies: Dayton Power & Light Co.; Hartford Electric Light Co.; Pennsylvania Power & Light Co.; Public Service Co. of Colorado; San Diego Gas & Electric Co.

When Investors Pause to Look and Listen

easily could find reflection quickly in renewed market weakness.

Implications of Detroit unemployment

Transition of an increasing segment of the nation's productive facilities to war business has been a faltering one, to date, with neither corporate management—nor the Federal government itself—knowing what the latter proposes to do or even how it plans to do it. If any proof of this is needed it is afforded in the experience of Detroit, the so-called center of modern industrialization.

YET, WHAT HAVE WE HERE? AN UNEMPLOYMENT SITUATION WHICH, IF IT WERE TO SPREAD IN THE SAME PROPORTION TO THE REMAINDER OF THE UNITED STATES, WOULD GIVE US APPROXIMATELY *12,000,000* UNEMPLOYED. THAT WOULD EQUAL THE RECORD IN THE WORST DEPRESSION YEARS OF THE EARLY 1930's.

Small wonder that investors are adopting an attitude of extreme caution!

If ever business has been on a treadmill the time is now. Not even through breakneck expansion in sales or revenues is it able to hold net earnings at the year earlier level. Witness, in this respect, the fact that corporate profits *before taxes* in 1951 mounted to an all time record high of $45.4 billion—about ten per cent above 1950. Yet net profits *after taxes* fell to an estimated $18.1 billion, or a full twenty per cent below 1950.

From retained earnings to debt

Even retention of earnings over a long term of years has proven to be no palliative. As an example one need only check the bitter experience of Pittsburgh Plate Glass Company. After financing its entire post-war expansion of well above $100-million out of retained earnings, the company now has to ask stockholders for permission to put itself into debt.

"This becomes necessary not only because of the direct drain on cash through taxes," the company states, "but also because taxing authorities refuse to grant proper depreciation allowances for replacement of plant and equipment at current higher prices."

Utility earnings, dividends high

Despite the necessity for adhering to original cost of property valuation in many states under regulatory commission order, the public utility companies have been able to hold earnings and dividends at a high level. Only recently have they been forced to seek compensatory rate increases after having reduced charges to consumers consistently over a long period of years. Free from excess profits taxes in most cases, with their financial houses in fine order and holding promise for continuing sharp growth, it is no wonder that the utility industry shares are finding wide favor with investors, both individual and corporate.

Prior to the recent market break, prime quality public utility common stocks were down to a yield basis of 5.35 per cent, second grades to 5.90 per cent and third quality to 6.50 per cent. They are now only slightly removed from these levels. Reduction in yields is traceable to confidence that utility dividends will be much better maintained than industrials, and that the group is about the most protectively situated against the mounting tax burden, heavy as it has been even for these regulated companies.

What of mutual savings banks?

Investment trust and pension firm buying of utility stocks has been heavy, and considerable further buying from both sources still is in prospect. Whether mutual savings banks will add any portion of their investment funds to acquisition of utility shares is conjectural.

The best estimates currently available are that the mutual savings banks over the years ahead might transfer a maximum of possibly $500 million into either tax exempt obligations and/or higher yielding common and preferred stocks.

The bill as drawn and now before the New York Legislature would permit banks to place a maximum of five per cent of their assets in stocks. No objection to the bill has been voiced by the New York State Banking Department.

As limitations, however, banks would have to confine their investments to securities of companies which have shown substantial earning power over the past decade; the stock to be acquired should be registered on a national securities exchange; and it should have a ten-year cash dividend record. Furthermore, if the company in which investment is proposed to be made should have outstanding preferred stock or 'guaranteed' stock, the latter security or securities would have to meet the qualifications for 'legal investment.' These qualifications are earnings equal to at least one and one-half times combined fixed charges, contingent interest and dividend charges during the preceding five years, and satisfaction of this requirement in either of the two years immediately preceding the investment.

The total limitation on purchase of equities by savings banks would be five per cent of assets, or 50 per cent of surplus and undivided profits, whichever is lower. The bill also places a ceiling of three per cent of assets, or one-third of surplus and undivided profits, whichever is lower, on the amount which may be invested in either of two classifications—corporate stocks generally or stock of an investment company.

One economist's views

Explanation of the movement of equity money into sheltered situations, such as the utilities, and of the recent shakiness of industrial common stocks, was summed up briefly by Dr. Marcus Nadler of New York University in his remarks to the Mid-Winter Trust Conference of the American Bankers Association.

Absent a war, he pointed out, the peak of the defense effort, and of corporate capital expenditures, should be witnessed at the end of 1952 or in 1953, with consequent effect on the nation's economy. With a downturn in war expenditures and in capital expenditures by corporations, business should retract, the sellers' market which we have been witnessing for many months past will disappear and net earnings of corporations are expected to continue the downturn until below the level of the past two years.

Completion of this cycle would impart considerable support to bond quotations at the expense of stocks, a development which would come as a mixed blessing to the utility industry, both electric and gas, which still will be in the market for considerable additional sums of new capital.

The utilities recently have been obtaining their new bond money on a more advantageous yield basis than a year ago. Common stock financing also has increased considerably, and at a favorable rate.

Given a further short period of favoring stock market conditions the utility companies conceivably might be able to do sufficient additional equity financing to strengthen their equity position. Then they might be able to view equanimicably any softening of share prices in favor of bonds as they set about doing the further necessary financing in a period of generally declining business conditions.

Courts Rule on Rate Determinations

by Leo T. Parker

Attorney at Law

IT IS ADVISABLE under present unusual conditions and unstable prices of materials and employes that gas company officials have at hand scientific data, verified by leading higher court decisions on modern gas rates and their validity.

Such data should contain references to the proper and legal method of determining whether and under what circumstances the higher court will sustain a Public Service Commission's decision; whether the rate established by the commission is confiscatory; what part of the gas company's original investment is considered; what part of the gas company property is duly considered for valuation and the present method of arriving at valuation; the kinds of expenditures allowable; and the effects of business cycles on establishing gas rates.

Validity of valuations

Although a Public Service Commission may presently fix a "fair value" on a gas company's property for rate-making purposes, since gas rates affect the future, due consideration must also be given to the past and the present in order that a "reasonable" and valid rate may be established. Courts are likely to uphold a valuation considerably higher than the "present" cost of reproduction, because criteria for ascertaining market value of gas company properties are not commonly available. The value of the properties must be determined under inescapable and broad limitations, since the courts have refused to be bound by any artificial rule or formula under which our present unusual or future conditions may remain fixed.

An important point of law involves the legal right of a gas company to classify its consumers and establish *different* rates for different consumer classifications. The courts realize that innumerable considerations must necessarily enter into the question of determining gas rates. Therefore, in fixing rates, the distributor and seller of gas must consider the cost of the product, as well as the ability of the consumer to use it advantageously in his home or business. The volume to be supplied is an important consideration, together with the cost of distribution. Also, the gas seller must consider the competition from distributors of other fuels, such as wood, coal, oil, and electricity.

For these and other reasons, no valid complaint of unreasonable high gas rates can be based upon a plea that the rate is discriminative, or unreasonable, without clear proof that consumers operating under similar conditions and circumstances have the benefit of a lesser rate. Therefore, a gas company may legally, and without discrimination, establish a lower rate for a consumer classification whose service is less expensive, or with less hazard, than the service supplied other consumers. See Wolf v. United Gas Public Service Company, 77 S. W. (2d) 1091.

Another important point of law upheld by the higher courts is that a gas company may not legally sell gas for less than lawful rates specified by valid laws, or the Public Service Commission.

For illustration, in Mapleton v. Iowa Public Service Company, 223 N. W. 476, it was shown that a state law was passed which provides that municipalities shall have power to regulate and fix the rates for water, gas heat, light or power.

A city ordinance was passed which fixed the gas rate, but the gas company adopted rates lower than the ordinance specified. The city filed suit to compel the company to increase its rates to those specified in the ordinance. Gas company counsel contended that the state law is invalid.

The court held that the company must charge the rates specified in the ordinance, saying, "On the face of the record, each party appears to be contending for the privilege of generosity toward the other. Apparently, also, neither party has a grievance. . . . The reader of the foregoing will naturally query: What is the matter? Where is the storm area? Why the tempest? Here is the rub: A public utility, operating under a franchise, has no constitutional right of competition . . . The business of a public utility, under statutory regulation becomes, by force of the statute, a legal monopoly."

Therefore, it is quite apparent that a *valid* city gas rate ordinance is enforceable although the gas company may desire to sell gas at a lower rate than specified by the ordinance.

Obviously, it is seldom that city officials would endeavor to compel a gas company to charge a higher rate than the low rate specified by the company itself, unless such officials have an unusually good reason! In the case cited, the city also sold gas, and the city officials did not want the gas company to cut rates.

When rate is insufficient

In litigations involving gas rates the courts generally determine whether the rates will yield over and above the amount of money required to pay taxes and proper operating charges, a sum sufficient to constitute "just" compensation for the use of the gas company's properties. Irrespective of the final decision rendered by rate-making bodies and lower courts, the higher court will investigate the true conditions and render a decision in accordance with these rules.

For example, in Fort Worth Gas Company v. Fort, 35 F. (2d) 743, it was disclosed that a gas company applied to the proper officials of the city for an increase in its rates. The city did not act upon the application and the gas company appealed to the state commisison. After a full hearing, the commission denied the application and found that the rate base of the company was $4,000,000, and that the rates under which the company was operating enabled it to earn nine per cent thereon, which afforded two per cent for depreciation reserve and seven per cent compensation.

The gas company then filed suit to enjoin the city from interfering with its putting into effect increased gas rates. Counsel for the company contended that the increased rates should be allowed because the *future conditions* and high cost of operation would not enable the company to *continue* to earn a reasonable income on its investment.

After consideration of the testimony, the court concluded that although the present rate netted a reasonable income, the rate was insufficient in view of existing circumstances indicating higher future operating costs which would affect the future income of the gas company.

This court said, "A rate depends upon the property value at the time of the effective date of the order *and for a reasonable time thereafter*. The present and the future must be considered."

What are depreciations?

Higher courts are in accord with the legal rule that "depreciation reserves" are amounts set apart annually from income for the purpose of replacing gas companies' properties when worn out or discarded at the end of useful life. This figure is calculated by ascertaining what amount invested in good, safe securities, with interest added annually, will be reasonably sufficient to replace worn out plant and equipment when no longer useful.

Expressed from another point of view, "Depreciation is the loss, not restored by current maintenance, which is due to all the factors causing the ultimate retirement of the property. These factors embrace wear and tear, decay, inadequacy, and obsolescence. By the 'straight line' method of computation the annual depreciation charge is obtained by dividing the estimated service value by the number of years of estimated service life. This method of calculation is designed to spread evenly over the service life of the property the loss which is realized when the property is ultimately worn out and retired from service." See Hughes v. Illinois, 292 U. S. 151.

With respect to lawful income after depreciation, the Supreme Court of the United States said in Bluefield v. Public Service Commission, 262 U. S. 679, "A rate of return may be reasonable at one time and become too high or too low by changes affecting opportunities for investment, the money market and business conditions generally."

In United v. West, 280 U. S. 234, the Supreme Court said, "What is a fair return within this principle cannot be settled by invoking decisions of this court made years ago, based upon conditions radically different from those which prevail today. The problem is one to be tested ordinarily by present day conditions."

Speculative allowances

Annual allowances of depreciation are made for the sole purpose of maintaining gas company equipment and property in normal operating condition and to equalize the costs of retirements and replacements from year to year. See United v. West, 280 U. S. 234; Lindeheimer v. Illinois, 292 U. S. 151.

The higher courts hold that an allowance for depreciation must be made for the future as well as the past. While the history of a company's depreciation is a factor, it is not the only one. And whether "going concern" value should be considered depends upon the financial history of the company. When substantial allowances for organization, interest, emergency and other general expenses are made, a specific allowance for "going concern" is not necessary. See Hardin v. Public Utilities Commission, 162 N. E. 262.

Quite obviously, an allowance for the payment of Federal and state taxes must be made in all rate cases. Galveston, 258 U. S. 388.

An important point of the law is that a court will not permit a public service commission to overlook state excise taxes because of the assumption that the gas company's business may improve in the immediate future.

For illustration, in East Ohio Gas Company v. Public Utilities Commission of Ohio, 12 N. E. (2d) 765, it was shown that the Commission refused to consider certain taxes of the company on the contention that improvement in economic conditions might result in increased sales and profits for the company with the result that profits may offset increased operating expenses.

The higher court promptly overruled and reversed this decision, saying; "Such a ruling is predicated upon a speculative assumption that neither court nor commission can make. To withhold a complete allowance for taxes because business may improve is mere guesswork."

Gas rate not monopolistic

Considerable discussion has arisen from time to time over the legal question, "What is the object sought to be attained by the United States Constitution, or state constitution, providing that every combination and contract is void if the purpose of such combination or contract is to 'fix' the prices or regulate the production of any article of commerce?"

A leading higher court held that a law is valid by which gas rates are fixed irrespective of these constitutional provisions, providing such rates are not so low that the income capable of being earned by the gas company is unreasonably inadequate.

For illustration, in Great Northern Utilities Company v. Public Service Commission, 293 Pac. 294, it was disclosed that a commission fixed maximum and minimum rates to be charged for gas. The commission acted by authority of a state law.

In subsequent litigation the higher court held the law valid, saying, "It is conceded that legislation may be enacted determining the maximum charge to be made by a public utility; but the specific objection here is that to fix a precise rate is violative of the Fourteenth Amendment to the Constitution of the United States, in that it deprives the utility of its constitutional right of freedom of contract in relation to its property. . . . The Fourteenth Amendment merely prevents the states from depriving any person of property without due process of law. . . . We are of the opinion that the power conferred by our statute upon the Commission to fix precise rates does not contravene the provisions of the Fourteenth Amendment to the Constitution of the United States."

Which law is effective?

It is important to know that all laws regulating gas companies are void which are unreasonable, discriminatory or arbitrary. This is well-settled law. The lawful limitation on the legislative discretion is that the regulations must be reasonable, not arbitrary, and must have a fair and substantial relation to the object of the legislation, so that all gas companies and gas consumers, under similar circumstances, shall be treated alike. Therefore, the power of state legislatures in this matter is very broad and comprehensive, subject only to the limitation that its laws must be made upon some "reasonable ground." Also, a city ordinance contradictory to a state law never is valid.

Considerable controversy has arisen in the past few years, in different localities, on this question, "When and under what circumstances are municipal ordinances valid and enforceable which specify a new or different *kind* and *quality* of gas that must be supplied by the gas franchise holder?"

It is important to realize that new state laws and city ordinances automatically repeal older laws and ordinances, where confliction or contradiction exist between the older and the newer. These points of law were decided by the higher court in the case of City v. Public Utilities Commission, 30 N. E. (2d) 797.

The facts of this case are that the council of a city passed a new five year ordinance (1) fixing gas rates and (2) also providing that the gas company should furnish only *undiluted natural gas* to its consumers in that city. The company refused to accept the terms of this ordinance and filed suit.

During the trial, testimony showed that the gas company has been in existence for more than 100 years, and during that period operated under several franchises of varying terms, during which it had supplied "mixed gas" service. This mixed gas service consists of furnishing a mixture of four varieties, (1) natural gas, (2) so-called stabilized natural gas, (3) gas manufactured by the company in its own plant, and (4) coke oven gas.

The point in this litigation was that if the gas company shall be required to operate under the new ordinance, three of the four varieties of gas served in the past must be discontinued.

Refrigerator Operation Better After Conversion—Staten Island Analysis

NEW YORK AND RICHMOND GAS COMPANY, serving Staten Island in the City of New York, can properly be considered a "veteran" natural gas distributing utility of the northeastern seaboard. Conversion to straight natural gas started in the Summer of 1949 and was completed later in the year. [AMERICAN GAS JOURNAL, September 1949.]

The company has just completed two full years of operation with straight natural gas and reports some significant experiences and trends.

While certain sections of the City of New York have been plagued by a series of unfortunate gas refrigerator "incidents," the New York and Richmond Company has not had a fatality due to gas refrigerator operation.

Company officials told AMERICAN GAS JOURNAL that their experience indicates that gas refrigerators are operating better on natural gas than on manufactured gas. This conclusion is based on an analysis of type and number of service calls during 1948, the last full year of operation with manufactured gas, and during 1950 and 1951, the first two years of operation with straight natural gas.

When asked the question, "What are the major factors in a program calling for unfailingly good customer service?" John Kohout, president of the company said: A high type of properly instructed serviceman, and periodic inspection of gas refrigerators. Mr. Kohout stressed that his company's servicemen *want* to do good jobs on customers' premises.

Refrigerators in use

On January 1, 1948 there were 899 water-cooled gas refrigerators on the lines of New York and Richmond Gas Company. During the next three years there were no new installations of water-cooled refrigerators and 88 were removed from service, giving a total of 811 in service on December 31, 1951.

The company reports 4,584 air cooled gas refrigerators in service on January 1, 1948. From then until December 31, 1951, there were 905 new refrigerators installed, and 39 were removed from service, resulting in 6,261 in service at the end of 1951.

Air-cooled refrigerators

In 1948, with manufactured gas, there were a total of 860 service calls for flue trouble. Of these, 364 were for carbon stoppages, nine for rust scale, and 487 for hard condensate caused by sulphur in the manufactured gas.

In 1950 the breakdown of 595 flue service calls was carbon 21, rust scale 69, and hard condensate 505.

In 1951 flue service calls had fallen to 224. Of these, 16 were for carbon and 115 for rust scale. Hard condensate was reduced to 93.

Service calls for burner trouble in 1948 amounted to 534. In 1950, there were 757 burner trouble calls and in 1951 the figure rose to 836. However, in spite of this increase in burner service calls, total service calls on air-cooled refrigerators dropped from 2,209 in 1948 to 1,856 in 1951, indicating a sharp drop in other classifications, principally flues. Thermostat service calls also fell appreciably, from 508 in 1948 to 442 in 1951.

Special flue investigation

New York and Richmond Gas Company made a special investigation of 104 gas refrigerators between November 29, 1950 and December 26, 1950, to determine what amount of foreign matter was being deposited in the flues as a result of natural gas operation.

All of the 104 gas refrigerators inspected in this special test had been checked and cleaned during the period March 15, 1949 and April 15, 1949. From then until late in August 1949, these refrigerators operated on carburetted water gas. From late August 1949 until the special investigation, approximately fifteen months, the refrigerators operated on straight natural gas.

In virtually all cases of the special investigation, deposits of foreign matter—rust, condensate, dust, or a combination—were found. However, in no case did the company consider the amount of the deposit to be significant, except in one model F 70 situated in a cold pantry.

The company drew the conclusion that scale deposits seemed to be heavier in refrigerators with porcelain lined flues.

Generally, a four-year cleaning cycle will maintain gas refrigerators in satisfactory working order on straight natural gas, according to Rutherford Van-Vliet, general superintendent of the company, and Joseph V. Turpish, assistant superintendent of distribution.

Summary of flue investigation

Refrigerators in special test: 44 models, ranging from EL 4 to S 800.

Flue construction: 11 units, verticle; 53 horizontal; 41 horizontal side-to-side.

Generator flue condition: Vertical, all clean; horizontal, rust in one and 52 clean; horizontal side-to-side, rust in three and 37 clean.

Front to back flue condition: 28 clean, 12 had condensate.

Banjo condition: 29 clean, 25 had condensate and one had rust.

Flue extension condition: 36 clean, condensate in 52.

Dilution flue condition: Dust in all but two. The two had vertical flues, one clean and the other had condensate.

Carbon monoxide tests

It is a standard procedure of the company to make CO tests on all refrigerator service calls, regardless of nature. Flue tests must show zero-CO.

Conclusions

Speaking generally on the gas refrigerator and its operation on straight natural gas, Mr. Turpish said that he felt that all problems which might arise are capable of solution. He said that the experience of the company was that the soft flame associated with natural gas was responsible for the carbon monoxide found in flues. When the company adjusted for a sharper and smaller flame, this specific trouble was eliminated.

Comparison: Before and after natural gas

	Mfd. Gas (Last year) 1948		Nat. Gas (First year) 1950		1951	
REFRIG. IN SERVICE	(Number)		(Number)		(Number)	
January 1	5,483		5,908		6,182	
December 31	5,782		6,182		6,261	
REFRIG. SERV. CALLS		Per cent (Units in service)		Per cent (Units in service)		Per cent (Units in service)
Gen. serv.	2,849	50	3,243	52	2,240	36
To light	165	3	193	3	130	2
Parts replace.	1,067	19	1,020	16	928	15
Total	4,081		4,456		3,298	

Industrial-Commercial Sales Conference Program Announced by AGA

THE PROGRAM for the Sales Conference on Industrial and Commercial Gas, the Netherland Plaza, Cincinnati, April 16-through-18, is now practically completed and has been announced by American Gas Association.

Registration for the conference will start on Wednesday, April 16, in the fourth floor foyer of the hotel. Several committee meetings have been scheduled for the day earlier, April 15, starting at 9:30 AM.

Wednesday, April 16

INDUSTRIAL GAS DAY

10:00 AM—PAVILLON CAPRICE

R. A. Malony, presiding

Gas in the Fast-Growing Chemical Industry
G. R. Walton, industrial sales engineer, United Gas Pipe Line Company, Houston

Improved Load Factors Through Seasonal Sales
Larry Shomaker, vice president in charge of sales, Northern Natural Gas Company, Omaha

Rapid Heating for Industrial Processing
Frederic O. Hess, president, Selas Corporation of America, Philadelphia

2:00 PM—PAVILLON CAPRICE

Terry Hart, presiding

Industrial Gas in the Rearmament Program
Henry M. Heyn, sales manager—heat treat division, Surface Combustion Corporation, Toledo

Industrial Fuel Engineering as a Profession
D. A. Campbell, vice president in charge of engineering and research, Eclipse Fuel Engineering Company, Rockford, Ill.

Gas in the Gray Iron Foundry
Herbert Nash, general supervisor—industrial sales, Southern California Gas Company, Los Angeles

Thursday, April 17

GENERAL SESSION

10:00 AM—PAVILLON CAPRICE

R. A. Malony, presiding

Greetings
Walter C. Beckjord, president, The Cincinnati Gas & Electric Company

Educating Tomorrow's Customers
Terry Hart, general sales manager, Nashville Gas Company, Nashville, Tenn.

Gas for Guns and Butter
George F. Mitchell, president, American Gas Association; president, The Peoples Gas Light & Coke Company, Chicago

Award of Certificates—Industrial and Commercial Hall of Flame—H. A. Sutton, Public Service Electric & Gas Company, Newark

2:00 PM—PAVILLON CAPRICE

Terry Hart, presiding

Research an Essential in Sales Promotion
Hale A. Clark, chairman, committee on industrial and commercial gas research; industrial engineer, Michigan Consolidated Gas Company, Detroit

Gas Fires the Furnaces of Industry
To be announced.

What Kind of People Can Sell Now
Fred Smith, vice president—industrial relations, The William Powell Company, Cincinnati

5:00-7:00 PM

PROMENADE OF PAVILLON CAPRICE

Friendship Room Reception
Gas Appliance Manufacturers Association

7:15 PM—PAVILLON CAPRICE

Dinner with Entertainment

Friday, April 18

COMMERCIAL GAS DAY

10:00 AM—PAVILLON CAPRICE

R. A. Malony, presiding

A Hotel Man Looks at the Gas Industry
Albert Buenger, Sheraton-Gibson Hotel, Cincinnati

Our Best Sales Tool—Service
George W. Leidholdt, commercial supervisor, Central Indiana Gas Company, Muncie, Ind.

Meet the Competition
James J. Condon, manager, commercial sales department, The Peoples Gas Light & Coke Company, Chicago

2:00 PM—PAVILLON CAPRICE

Terry Hart, presiding

Let's Get the Whole Loaf
Clinton B. Cole, engineer, Rochester Gas & Electric Corporation, Rochester, N. Y.

The Commercial Cooking Competitive Picture
Hayes S. Walter, commercial cooking representative, American Gas Association, New York

Committee Meetings and Chairmen

*APRIL 15—9:30 AM

Industrial Gas Practices—Parlor J—Charles C. Eeles

Metals—Parlor L—Stanton T. Olinger

Textile and Paper Processing Subcommittee—Parlor E—E. Gilbert Silven

Food Processing Subcommittee—Parlor K—Samuel E. Tappan

Glass and Ceramics Processing Subcommittee—Parlor F—Robert C. LeMay

Industrial Drying Processes Subcommittee—Parlor H—Clifford L. Nelson

Chemical Processing Subcommittee—Parlor G—William S. Sims

*APRIL 15—1:00 PM

Industrial Processing (full committee)—Parlor H—Everett V. K. Schutt

APRIL 16—9:30 AM

Equipment Improvement—Parlor J—L. J. Fretwell

Commercial Processing—Parlor L—John Black

APRIL 17—8:30 AM

Breakfast meeting—Industrial and Commercial Gas Copy Committee—Parlor J—L. Ourusoff

APRIL 17—4:30 PM

Nominating Committee—Parlor J—C. H. Lekberg

Programs and Papers Committee

Ralph S. Wenner, *Chairman*, The Ohio Fuel Gas Co., Columbus

Gas Appliance Manufacturers Association Friendship Room Committee

Merrill H. Douglas, *Chairman*, Vulcan-Hart Manufacturing Co., New York

*These meetings will be held the day before conference opens.

Old Days Recalled... from AMERICAN Gas Journal

90 Years Ago
March, 1862

IT HAS LONG BEEN KNOWN *that a beautiful illuminating gas can be distilled from petroleum or coal oil, but the principal difficulty has been want of performance. The product has presented the appearance of being a compound of hydro-carbon vapors, liable at any time to condense and deposit in drops. Some experimenters claim to have avoided this result but they have not yet proved the reliability of their assertions. It would be a fortunate circumstance for consumers if this were the case.*

1862

THE AVERAGE PRICE OF COAL GAS *in the United States is within a fraction of $4.06 per thousand cubic feet. In this calculation the prices of the California gas-light companies are included, which are much higher than those charged in the older states. The Marysville Cal. Gas-Light Company brings up the rear with the exhorbitant price of $12.50 per thousand cubic feet. This average must be considered as too high for the mutual benefit of producers and consumers, especially when kerosene oil presents so many claims on the public as an economical illuminating agent. Gas engineers would do well to look this matter in the face and act accordingly.*

1862

LIGHT UP THE FORTS! *Where in the world are the builders of gas works? Why is not Fort Lafayette lighted with gas? and Fortress Monroe and Fort McHenry and Fort Warren? These various establishments are filled with boarders who would much prefer the brilliancy of gas light to the dim desolation of adamantines and coal oil. Let the forts be lighted!*

1862

THERE ARE *in the various districts of Philadelphia, under charge of the Department of Public Lighting, six thousand six hundred and seventeen street lamps, of which three hundred and twenty-three burn fluid and the remainder gas.*

50 Years Ago
March, 1902

MRS. HELEN ARMSTRONG, of Chicago, whose fame and ability as a lecturess on the satisfying art of cookery, rest on stability, writes us that she is ready for the road, with many engagements ahead. The first of her demonstrations will be made this year in New Orleans, La., where she will lecture on behalf of the New Orleans Lighting Company for a fortnight at least. The company has placed such a phenomenal number of ranges there the past year that now it is mainly a question of having them used for all cooking, etc.

1902

THROUGH THE COURTESY of Messrs. John J. Griffin & Company, Philadelphia, we are in receipt of a copy of a well-put together pamphlet that is mainly devoted to an intelligent and complete description of the value and use of the prepayment meter. It seems to be the fashion just now to make little of this device, but much has been done in the past with the use of the prepayment meter in extending the use of gas in odd places.

1902

AMONG THE GAS ADVERTISING novelties tried this season is the issuing by the Consumers Gas Company of Reading, Pa., of a set of buttons of the political campaign order. Those that we have seen carry the following inscriptions: "Have You a Gas Range? If Not Why Not?—If You Love Your Wife Buy Her a Gas Range—My Mamma uses a Gas Range, Does Yours?" The one bearing the last noted inscription is given to children only.

1902

THE AGGREGATE DAILY OUTPUT capacity of contracts awarded the United Gas Improvement Company so far this year, for its standard double superheater Lowe water gas apparatus is about 14,500,000 cubic feet.

1902

THE WATER GAS ADDITION to the plant of the Houston (Texas) Company is in satisfactory operation.

"Research" Defined by Revenue Bureau

Significant uptrends in research activities throughout industry have been noted by the Bureau of Internal Revenue in corporate tax returns to the extent that the tax collectors have attempted to define research for the dual purpose of clarifying permissible deductions and to set up limits beyond which there was no escaping taxation.

The Bureau has proposed a definition which, if finally approved, will read as published in *Federal Register*, January 8, page 209:

"(IV) For the purpose of this section, the term 'research' does not include activities of a type ordinarily carried on as incident to commercial or industrial operations, for example, the ordinary testing or inspection of equipment, buildings, etc. The term 'fundamental research' does not include research carried on for the primary purpose of commercial or industrial application."

American Gas Fundamentals

OUTLINE

Natural Gas
- *Geology
- *Drilling and Completion

Manufactured Gases
- *Coke oven gas; producer gas, blue gas; carbureted water gas
- *Reformed gas
- *Hi-Btu oil gas

Basic Gas Laws
- *Perfect Gases
- Supercompressibility

Transmission
- *Pipe lines
- Corrosion and pipe protection
- Compressor stations
- Hydrates and dehydration
- *Gas conditioning
- Flow formulae
- Orifice meter measurement

Gas Storage
- *Methods of storing gas

Gas Distribution
- *System design and operation
- *Pressure Regulation, Part 1
- *Pressure Regulation, Part 2
- Leak detection and control
- *Metering
- Measurement and accounting

Gas Utilization
- Combustion characteristics
- Domestic
- Commercial and industrial
- Interchangeability

Conversion Practices

Management Problems and Policies
- *Corporate structure
- Public utility regulation
- Public relations

*** Indicates chapters that have been printed since January 1, 1951; available without charge to new subscribers to American Gas Journal.**

How to Use the Material

American Gas Fundamentals *is a comprehensive compilation of basic gas facts to guide any gas utility employee toward a broader understanding of the industry as a whole. It is written in layman's language so that the technical fundamentals of every subject treated may be digested and understood by the non-technical reader.*

The series is designed to be removed from each current issue of AMERICAN GAS JOURNAL *and filed in a ring binder where it may be accumulated into a text book of permanent usefulness. Material should be filed under the major subject head appearing in the upper right hand box at the head of each chapter.*

Leak Detection and Control Methods

LEAK DETECTION and leak control surveys are becoming an increasingly essential activity of all gas companies, from those operating the largest gas transmission lines to the distributing utilities operating within the confines of their service areas.

Unaccounted-for-Gas, as the term is used in the industry, is the *apparent* plus the *actual* loss of gas somewhere between the manufacturing gas plant or the transmission companies' gathering lines, and the customers' meters.

Apparent loss is the difference between the gas measured into a system and that measured out, but which has not really been lost or wasted in transit. One of the principal reasons for an *apparent loss* is the fact that gas may go into a line or into a system at a higher temperature than when it is measured at consumers' meters.

As was shown in the chapter on Perfect Gases, under Basic Gas Laws, the volume of any definite weight of gas increases proportionately as the absolute temperature increases and *vice versa.* Consequently, a gas that cools in transit will shrink in volume even though the system is perfectly tight.

Actual loss is gas that is metered into a transmission line or distribution system but leaves the system through leaks prior to being metered out. This form of loss is much more important because of the potential hazard and the direct loss of income to the operator.

When gas leaks from a pipeline, it normally contaminates the soil around the pipe in circular fashion. The size of the circle will depend on the particular soil in the area and the volume of gas being passed into this soil.

Gas from a leak often will spread a greater distance along the course of the pipe than in any other direction, until it comes to an opening where it can accumulate and mix with air to form a combustible mixture. This opening may be a manhole, a vault, a sewer or sometimes the basements of consumers' premises. Of course, the danger factor is the first concern of any gas utility. Poor public relations always follow in the wake of newspaper stories describing explosions, loss of life and damage to property. There is also a financial loss to the utility due to the cost of the gas lost and, possibly, due to lawsuit.

Gas companies throughout the country reduce these difficulties to a minimum through regularly scheduled programs of leakage surveys. Sometimes these are conducted by the gas companies' own crews; in other instances outside specialized service agencies handle the whole job on an annual contract basis.

Causes of Leakage

There are numerous causes for gas leakage, such as settling of the earth through traffic vibration on heavily traveled roads and movement caused by underground construction, landslides and erosion.

Any movement that disturbs the earth around a line may cause leaks, particularly around joints and connections where mains are joined together or where house service lines tie in.

Corrosion, due to the chemical action of the surrounding soil or to electrolysis, is a common cause of leakage.

Expansion and contraction of a pipeline, caused by temperature changes in the soil, may loosen joints and, in time, cause leakage at these joints.

The basic aim of any complete leakage control program is to inaugurate and maintain a plan which will quickly, accurately and economically locate and classify leaks according to their importance, followed by an efficient leak repair program. The first leaks to be repaired are those which are a potential hazard to life or property as well as those which are losing a large volume of gas.

Survey Methods

Many leakage surveys are made annually and designed so that the entire distribution systems are checked at least once a year. When leaks located in these annual inspections are plotted on maps, and kept from year to year, it is not long before the areas with highly corrosive soil or other factors unfavorable to a tight line can be singled out. Those areas are thereafter subjected to more intensive and more frequent inspection.

There are various methods of conducting leakage surveys, some of which are better suited for particular areas than others. The method of determining the location of the tests will vary, but actual testing procedure is substantially the same whether the survey is carried on by the utilities with their own crews or by outside firms which specialize in leak location surveys.

Bar Hole Tests

One common method is the bar test survey. Here, testing crews generally begin with a handbar, but sometimes with a pneumatic drill. A small amount of the sub-surface atmosphere, which may or may not contain gas, is drawn from the holes into a device called a combustible gas indicator which, as the name implies, indicates whether or not gas is present in the hole and in what concentration.

The principle of operation of the indicator is described later in this chapter.

Testing crews may make tests at predetermined intervals directly over the mains and service lines. These holes are often 50 feet apart over the mains but at 15-foot intervals along services, with a stipulation that at least three points on each service line are tested. The latter three

points generally are over the main connection, at the curb, and directly against the building wall.

The testing crews keep accurate records of measurements on report forms. The results from each bar hole are noted and the reports are turned over to leak repair crews who follow them. In most cases, regardless of the cause of the leaks, it is necessary to dig down and expose the pipe to make repairs. If leaks are at caulked joints, the joints are cleaned and recaulked or repaired with joint clamps. Other leaks may be eliminated through the use of repair clamps which are gas-tight split fittings that are bolted over holes or flaws in the pipes.

The bar testing method makes a very thorough leakage survey but it is expensive. It is particularly suitable and economical for sections of a distribution system which are known to be in bad condition, and also those which cannot be thoroughly surveyed by any other means.

Surveys with Listening Devices

Listening devices, such as soundographs and stethoscopes, often can be used to advantage to survey sections of distribution systems where most of the leakage probably is due to either broken pipe or electrolytic punctures. In this type of survey, the instrument is attached to the pipe and the sound of escaping gas may be heard from varying distances depending upon, among other things, size and shape of the holes through which gas is escaping.

Curb Box and Manhole Surveys

A very important part of any leakage survey is concerned with sub-surface openings and pits. The atmosphere in all openings, such as manholes, vaults, sewers and service boxes, in the immediate vicinity of a gas line should be checked at regular intervals with combustible gas indicators. In congested areas such openings may be tested once a month.

Here again, the most accepted practice is to check all these openings, report the results on forms and record the positive tests on maps of the distribution systems. Following preliminary investigations, more exact surveys are made where accumulating gas has been discovered. This is necessary in order to pin-point leaks before repairs can be made. The same procedure is followed in pin-pointing leaks as in the bar hole tests described above. Barring-down to lines that run under paved highways generally involves the use of pneumatic drills.

Combustible gas indicators are used again in every hole and leaks are finally pin-pointed at or near the points of highest meter readings. At these points holes are dug to the mains or service lines. The points of loss usually are found, readily, at leaking joints, rusted-out service stubs or cracked, broken main or pipe. The success of this method depends, to a large extent, on leaking gas following the pipe lines to one of the openings which are tested. This is not always successful, however, as gas will sometimes follow other courses. It may come directly to the surface through the soil or it may find channels which will lead it completely away from the gas lines.

Employee Observations

Occasionally, field employees of gas utilities, in the course of their routine work, will discover gas leaks. It is helpful, therefore, to train these employees to recognize leakage, either by the odor of the atmosphere or by obvious vegetation damage. In addition, some leaks will be reported by customers or found as the result of customers' complaints. All this leakage information may be very helpful but the very fact that leaks may be discovered *by chance* proves the need for a systematic leakage control program which provides for surveys by specialists, properly trained and equipped.

What is everybody's business is quite often nobody's business, and random discovery of leaks by customers or servicemen cannot be regarded as a satisfactory control program for gas leaks. Another shortcoming of this plan by itself is that the utility never gains a complete picture of the condition of its underground plant over a concise period, and thus may lack the records necessary to an overall program of maintenance and repair.

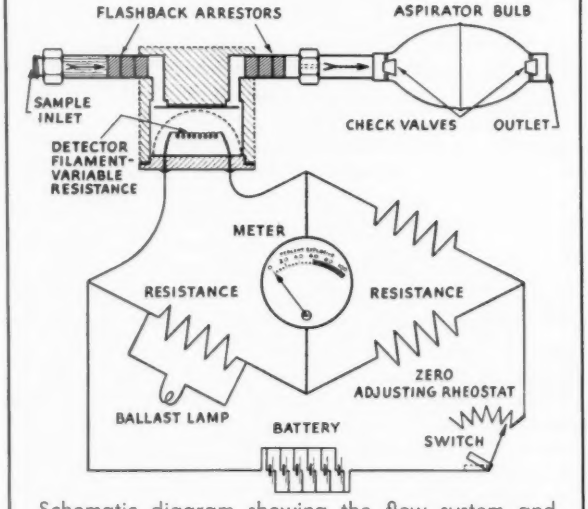
Public Buildings Surveys

Most companies are very meticulous about maintaining systematic leak surveys in or near public buildings, such as hospitals, schools and churches. In these surveys, a visual inspection is made of all interior piping and service and the lines outside the buildings are checked through bar holes. This survey is primarily designed to prevent accidents at locations where extensive personal injury or loss of life might result if leakage situations remained uncorrected for any length of time.

Vegetation and Soil Survey

This type of survey, most often made by specialized professional organizations, has come to be regarded as highly effective, particularly in residential areas where it is possible to observe the condition of lawns, trees and shrubbery.

Experienced gas men have long known to look for leakage under spots of dying or dead grass, trees, shrubs or other vegetation. Surveys of this type are most often made by leak-detection specialists who are familiar with forestry



Schematic diagram showing the flow system and wiring of a combustible gas indicator. The whole instrument is housed in a small case which the operator can carry strapped to his chest.

and recognize whether damage is the result of gas leakage or whether it is a condition brought about by insects, pests, diseases, droughts or poor soil conditions.

Obviously, vegetation surveys must be conducted during the growing season and cannot be employed in commercial or congested areas where there is little or no plant life to be observed. In commercial or congested areas they should be supplemented by thoroughly systematic bar surveys. Specialists in vegetation surveys usually recommend and try to institute complete programs that include entire distribution systems, locating and classifying existing leaks according to importance. The work may be done in connection with, or entirely separate from, gas company personnel.

Essentially the vegetation phase of the survey consists of sending experienced foresters along the streets and service mains of distribution companies to look for vegetation irregularities. When either vegetation or soil symptoms indicate suspect areas, bar tests are made to ascertain whether or not leaking gas is the cause. To be most effective, these surveys also should include checks of all unusual fittings, underground vaults, as well as locations where leakage normally can be anticipated.

Classification of Leaks

Leaks are customarily classified as follows:

Class A—Where a small quantity of gas has been found but, because there is no danger of a hazardous condition or potential property damage, repair can be deferred until more important leaks have been repaired.

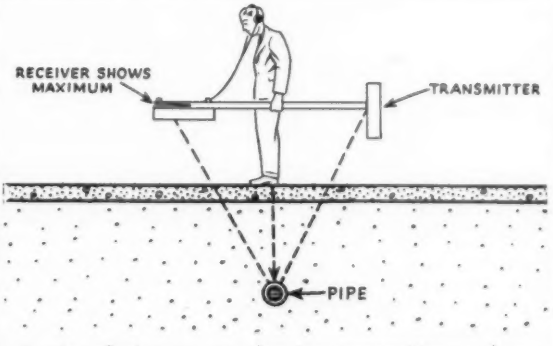
Class B—Where a larger volume of gas has been found but there is little danger of a hazardous condition or potential property damage.

Class C—Where an exceptionally large volume of gas is located or where a leak of any size is creating a hazardous condition and may involve loss of life or property damage. It is necessary that this type of leak be given immediate attention.

Regardless of the method used, or whether surveys are made by utility employees or by detection specialists, accurate reports are essential to reflect, over a period, the true condition of the underground piping.

Combustible Gas Indicator

In recent years, instruments have been designed and sold commercially for the detection of the presence of combustible gases in any given atmosphere. They are based on the same general principle of operation, that the electrical resistance of a wire changes with its temperature, and are known as catalytic type instruments.



A pipe finder in use showing transmitter and receiver loops coupled together with a pair of carrying handles. Operated thus, it indicates the presence of metal when passing directly over it.

A sample of the atmosphere to be tested is drawn into the instrument by a hand aspirator bulb and allowed to flow over a catalytic filament in a small test chamber heated by flashlight batteries. The filament through the test chamber is electrically balanced with a second filament that does not come in contact with the atmosphere sample to be tested. The two filaments are, in turn, connected to a meter in such a way that any increase in resistance to the flow of electric current in the test chamber filament will deflect a meter needle in proportion to the increase in resistance. When a combustible gas comes in contact with the heated filament in the test chamber, the combustibles in the sample are burned on the filament. This raises its temperature and increases the resistance to electric flow in proportion to the concentration of combustibles in the atmosphere under test.

The graduations on the scales of most combustible gas detectors are calibrated to read as per cent of the lower explosive limit of any particular gas. To obtain accurate readings with an indicator, the meter must be calibrated to the gas used in the particular system being surveyed. All detector models in common use are portable, some as small as pocket-size comparing in dimensions and weight to a small folding camera.

Where gas to be tested is drawn from a bar hole, combustible gas indicators are equipped with connecting hose and long probes which may be inserted in the holes to draw the gas to the test combustion chamber by the small aspirator bulb.

It must be borne in mind that combustible gas indicators, unless especially equipped with filters or a variable rheostat to control the temperature of the filaments, will detect the presence of all combustible gases and vapors such as natural gas, manufactured gas, liquid petroleum gas, sewer gas and gasoline.

Pipe Locator

All systems of leak detection and repair naturally involve knowledge of the precise location of the buried pipe.

Since the last war, knowledge in the field of electronics, which was translated into radar and sonic locators, has been adapted to the manufacture of instruments for locating underground pipe.

Accurate system maps, with bearing points and precise measurements, may give the location of pipelines, but the pipe finder can be utilized even where the exact course or direction of the main is not known.

Finder equipment consists of a directional transmitter, a directional receiver, a pair of long handles, head phones and a carrying case.

The operation of the pipe finder is simple. There are two directional loops; one with a transmitter and one with a receiver. In use, the transmitter on the apparatus emits electromagnetic waves that are induced in the earth. Any pipe in the field of the waves acts as a path for return current that can be picked up by the receiver loop.

If both loops, transmitter and receiver are held in a vertical position over the pipeline, a maximum response is shown on the meter and a loud tone is heard in the earphones. If the transmitter is in a vertical position and the receiver in a horizontal position over the pipe, the response will be at a minimum. If the receiver is moved slightly

from side to side, the response will increase on either side of the center of the pipe. With both the transmitter and the receiver in the vertical position and approximately parallel but not over the pipe, the response in the receiver will be very low. When both loops are directly over the pipe, maximum response is obtained both on the 'phones and on the visual meter of the receiver. In this manner almost any pipe can be located easily and accurately.

Trained operators are able, by the use of pipe locators, to find the exact center of the pipe, its course and the depth at which it is buried.

Other Equipment

For making test holes standard equipment includes: a hand bar, which is a long tapered tool-steel bar with a handle near the top; a driving bar equipped with wrench handle or bar puller which is forced down by the blows of an eight-to-ten pound hammer; and a compressed air unit equipped with the necessary drills and bits.

As was mentioned previously, every company maintaining a leakage survey and repair program has its own report forms for recording positive leak locations and all other pertinent data. Distribution maps showing location of mains, services, drips, blow offs, main valves and service connections are also essential to the maintenance of a proper program. As is true in every phase of utility operation, leakage surveys must be well planned and properly executed to provide utilities with the protection they need against unaccounted-for-gas and the hazards of neglected leaks.

This chapter on Leak Detection and Control Methods was prepared by
Stuart B. Eynon, Supervising Engineer, Heath Tree Service, Inc., Wellesley, Mass.

350-MILLION CAPACITY ADDED BY FPC OKAYS, JUNE-DEC. 1951

DURING THE LAST SIX MONTHS of 1951, Federal Power Commission authorized construction of natural gas transmission facilities which will add more than 350 million cubic feet of daily delivery capacity to the pipeline systems.

The new facilities authorized during the period involve 1,463 miles of pipeline and have an estimated total construction cost of $86,498,922. Of the total construction cost, nearly $76-million was for major projects, each estimated to cost $700,000 or more.

The largest dollar-authorization during the six-month period was for El Paso Natural Gas Company, to expand its system capacity by construction of an additional 10 miles of 30-inch loop pipeline on its system in Texas and by installing a total of 56,070 additional compressor horsepower in main line and booster stations in Texas, New Mexico and Arizona. The El Paso project, estimated to cost $23,400,000, will deliver 100 million cubic feet of natural gas per day to existing markets in Texas, New Mexico and Arizona.

Cities of 50,000 population or more which will get new or additional natural gas as results of FPC authorizations during the last six months of 1951 include:

Arizona: Phoenix

California: Glendale, Long Beach, Los Angeles, Pasadena, Santa Monica, San Diego

District of Columbia: Washington

Illinois: East St. Louis

Indiana: Evansville, Terre Haute

Iowa: Cedar Rapids, Davenport

Kentucky: Covington, Lexington, Louisville

Maryland: Baltimore, Silver Spring

Michigan: Detroit, Dearborn, Hamtramck, Highland Park, Grand Rapids, Lansing, Flint, Jackson, Kalamazoo, Pontiac, Saginaw

Missouri: St. Louis

Nebraska: Lincoln

New Jersey: Elizabeth, Bayonne, Camden, East Orange, Hoboken, Irvington, Jersey City, Newark, Passaic, Paterson, Trenton, Union City, Atlantic City

New York: Albany, Binghamton, Buffalo, City of New York, Rochester, Syracuse, Troy, Utica

Ohio: Akron, Canton, Cincinnati, Cleveland, Cleveland Heights, Columbus, Dayton, Hamilton, Lakewood, Springfield, Toledo, Youngstown

Pennsylvania: Allentown, Altoona, Bethlehem, Chester, Erie, Harrisburg, Johnstown, McKeesport, Philadelphia, Pittsburgh, Reading, West Mifflin, York

Tennessee: Memphis

Virginia: Arlington, Norfolk, Portsmouth, Richmond

West Virginia: Charleston, Huntington, Wheeling

Wisconsin: Madison, Milwaukee, Racine

Conversion to Straight Natural Gas Started by Brooklyn Union

BROOKLYN UNION'S CONVERSION to straight natural gas, largest operation of this kind ever undertaken in the industry, started March 6 and will continue through Spring and Summer until September, when all the company's 925,000 customers in the Brooklyn and Queens boroughs of New York will be on natural gas service.

Conversion and Surveys, Inc., doing the work for the utility, has assigned 3,000 men to the job of converting the approximately 2 million appliances on the Brooklyn Union lines. The conversion will cost $21 million, to be amortized over a ten-year period.

For conversion, the gas company's territory has been divided into fifty-eight two- and three-day conversion districts with some 11,000 to 18,000 customers in each. This division required the installation of 1,200 sectionalizing valves over the system, will make it possible to introduce natural gas into the districts one at a time.

As natural gas is ready to replace manufactured gas in any area, a burn-off purging through special burners in the street eliminates all manufactured gas from the mains. There are 3,780 purging points in the territory, averaging about 65 per district.

Brooklyn Union has been receiving natural gas from the Transcontinental Pipe Line since January 12, 1952. Its present supply is all received via the intra-city pipe line which takes Transcontinental gas at the Hudson River crossing and distributes it to five utilities in the New York area. An auxiliary line which will provide a complete loop into Brooklyn Union territory is now being laid from a Transcontinental Pipeline connection at East Carteret, New Jersey. This line crosses from New Jersey to Staten Island, and thence under a section of New York Harbor, called The Narrows, to the Bay Ridge section of Brooklyn. Weather conditions permitting this new connection is expected to be completed by April 15 and gas from it introduced directly into the Brooklyn Union system in June.

The company operates 21 water gas sets, which will be converted to the manufacture of 1040 Btu oil gas, with a total capacity of 119 MMcf per day. This equipment will be operated, as needed, for peak shaving and maintained ready for standby in emergencies. The present contract availability from Transcontinental is 70 MMcf per day. Adding to these totals a possible 50 MMcf per day holder drawdown, Brooklyn Union estimates that when plant conversions are completed, it will be able to deliver 139 MMcf of high-Btu gas per day on peak days.

During the first year of natural gas, when it was being used for reforming and cold enriching in connection with the water gas sets, oil consumption was cut from 95 million to 14 million gallons.

The company's coke ovens, which have been using about 785,000 tons of coal annually will be dismantled and removed. In 1951 this plant produced 600,000 tons of coke, of which 110,000 went into gas making.

Brooklyn Union, which has been restricted in gas heating sales since the last war, expects to sell as many as 50,000 heating plants in the next five years. This will mean a 30 per cent saturation in the one- and two-family houses of the area, compared with 10 per cent at present.

The company merchandises gas appliances through eight retail stores and, at the same time, maintains an outstanding dealer relations program.

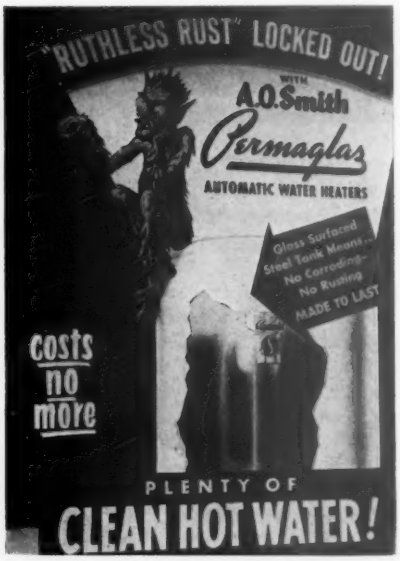
During the entire calendar year 1951, FPC authorized construction of a total of 6,091 miles of pipeline and installation of compressor units aggregating 426,500 horsepower. Total estimated construction cost is $471,383,184. Major projects each costing $700,000 or more, authorized during the year involve a total estimated construction cost of $454,657,645 and include 5,589 miles of pipeline and installation of 405,875 horsepower in compressor units.

Since February 7, 1942, when the present certificate provisions of the Natural Gas Act became effective, FPC has authorized a total of more than 43,800 miles of pipeline and 2,851,000 horsepower in compressor units. The facilities authorized since 1942 are estimated to cost nearly $3-billion and are designed to add more than 16 billion cubic feet of daily capacity to the pipeline systems.

Wood gas pipe excavated after 60 years.

MERCHANDISING NEWS

PERMAGLAS WATER HEATERS will be "sold" by a 5½ foot action display that features an obnoxious character named Ruthless Rust. Seated on top of a Permaglas Heater, apparently unhappy because



Permaglas display

he can't get inside the tank, he spends his working day spinning a two-faced yo-yo that tells his audience that "glass can't rust" and "costs no more." Two miniatures of the display have been prepared for counter and water heater top use. *Available* to Permaglas Automatic Water Heater dealers in kit form. A. O. Smith Corp., Water Heater Division, Kankakee, Ill.

ROPER RANGES look toward Spring and cleaning with a new cut-out display that forms a background for a range. Produced in eight colors and sturdily constructed for long life in either windows or at traffic

Roper Range display

points in stores, the displays are individually cartoned for shipping. *Available* to Roper Range retailers. *Price:* $12.95 each, f.o.b. Rockford. *By* Advertising Department, Geo. D. Roper Corporation, Rockford, Ill.

FIVE WATER HEATERS have been featured, individually, in a series of large-space newspaper advertisements that are a cooperative campaign by the "Natural Gas Companies serving the Greater Pittsburgh Area." Identically worded headlines

Pittsburgh newspaper ad

have different art treatments from ad-to-ad. The feature (train, ship, bicycle, bathtub, telephone) is compared, modern-against-old, with "good in its day . . . but times have changed!" Seven automatic water heater qualities are stressed in each ad. This is a local campaign prepared by Ketchum, MacLeod & Grove, Inc., Pittsburgh 19.

Natural Gas Production Up 16%—Reserves Up 4%

NATURAL GAS RESERVES in the United States, proved recoverable as of Dec. 31, 1951, totaled 193.8 trillion cubic feet, an increase of 4.4 per cent over the reserves estimate of 185.6 trillion cubic feet a year earlier. The reserves climbed to a new high level and had the second highest annual increase since these joint estimates by the Committee on Reserves of the American Gas Association and the American Petroleum Institute started. An all-time high of approximately 8.0 trillion cubic feet of natural gas were used during 1951. The latest production-utilization total for natural gas is 16.1 per cent higher than the 1950-total of 6.89 trillion cubic feet.

The AGA Committee on Natural Gas Reserves estimated that proved recoverable reserves of natural gas liquids also had risen to a record level, 4.72 billion barrels, on December 31, 1951. This compares with 4.27 billion barrels at the end of 1950.

An increase of 13 trillion cubic feet in proved natural gas reserves through extensions and revisions of previous estimates for existing fields reflects improved drilling methods and increased exploration programs.

Discoveries of new natural gas fields and new pools in old fields accounted for an additional three-trillion cubic feet. Estimated reserves of natural gas in underground storage at the end of 1951 were 132.8 billion cubic feet greater than in 1950.

Natural Gas Reserves and Production
(000,000 cubic feet)

	Dec. 31, 1951	Dec. 31, 1950	1951 over 1950
Natural Gas Reserves	193,811,500	185,592,699	+8,218,801
	1951 (year)	1950 (year)	
Natural Gas Production*	7,966,941	6,892,678	+1,074,263

*Figures for 1951 are net after deducting gas returned to reservoirs for cycling and pressure maintenance.

Natural Gas Liquids Reserves and Production
(000 bbl of 42 gallons)

	Dec. 31, 1951	Dec. 31, 1950	1951 over 1950
Natural Gas Liquids Reserves	4,724,602	4,267,663	+456,939
	1951 (Year)	1950 (Year)	
Natural Gas Liquids Production	267,052	227,411	+39,641

MEN AT WORK

Servel Changes Top Engineering Staff

Theodore W. Rundell has been elected vice-president in charge of engineering, Servel, Inc., company president W. Paul Jones announced.

Dr. William R. Hainsworth, who has been vice-president in charge of engineering, has been named staff consulting engineer to direct the company's long-range engineering program in many fields and will continue as vice-president.

Mr. Rundell comes to Servel from Philco Corp., where he was chief refrigeration engineer. Previously, he was a refrigeration engineer for the Westinghouse Electrical & Mfg. Co., Springfield, Mass., 1929 to 1939, and then joined Philco Corp.

Dr. Hainsworth's first refrigeration experience came as an engineer for National Refrigerating Co., Boston, and later for Winchester Repeating Arms Co., New Haven. He joined Servel in 1929 as a research engineer. In 1933, he received the American Gas Association's Munroe award for outstanding contribution to the development of the air-cooled Servel refrigerator. In 1935, he was elected vice-president in charge of engineering.

Herringshaw, Consumers Power VP

Donald E. Herringshaw has been elected vice president of Consumers Power Company. He has headed the gas department of Consumers Power Company since 1938 and has been vice president of the subsidiary Michigan Gas Storage Company since its organization.

Mr. Herringshaw's association with gas operations of Consumers Power dates from 1923. He worked in gas plants at Flint, Saginaw, Jackson, Kalamazoo and Lansing, prior to his advancement to general supervision of gas operations in 1928.

Stockhoff is GSM, Servel N. Y.

Clifford A. Stockhoff has been appointed general sales manager of Servel New York Corporation, distributor of Servel refrigerators and water heaters in the New York Metropolitan area. Mr. Stockhoff has been in the Servel organization for 15 years.

R. D. Scott Joins Honolulu Co.

Robert D. Scott has joined the Honolulu Gas Company as sales manager. His primary assignment will be to increase residential, commercial and industrial gas sales.

During the period just prior to going to Honolulu, Mr. Scott was director of appliance merchandising for the Fred Meyer stores in Portland, Ore.

R. G. Rincliffe is new PhilaElecCo Pres.

R. G. Rincliffe has been elected president of Philadelphia Electric Company, succeeding H. B. Bryans, who retired at the end of last month.

Mr. Rincliffe joined the utility in 1923 as an engineering assistant and progressed through various positions, including superintendent of gas manufacturing, purchasing agent, manager of electric generating stations, and vice-president in charge of electric operations. He became a director and executive vice-president in 1950.

Mr. Bryans retired after nearly forty-five years of service in the public utility business. In 1929 he was named vice-president in charge of operations of the Philadelphia Electric Company, was elected executive vice-president in 1938, a director in 1940, and president in 1947.

Chas. G. Young is new Springfield Pres.

Charles G. Young, who began his career with Springfield (Mass.) Gas Light Company in 1915, has been elected president, succeeding Isaac Hall, now vice-chairman of the company's board. Mr. Young was an accountant in the Springfield company, advanced to manager in 1937 and became first vice-president in 1948. He was a leader in the successful efforts to bring natural gas to New England. His company recently completed conversion of 250,000 appliances to straight natural gas.

Edwards Directs Roper Merchandising

Cy Edwards has been appointed merchandising director of Geo. D. Roper Corporation, Rockford, Ill. His new responsibilities include coordinating activities among the sales, merchandising, and advertising departments and implementing new merchandising services.

Prior to his recent appointment, Mr. Edwards was general advertising manager and advertising manager of the pump division.

J. A. Grazier New Amer-Stand Exec VP

Joseph A. Grazier was elected executive vice president of American Radiator & Standard Sanitary Corporation. At the same time, Mr. Grazier was named to the firm's board of directors and its executive committee. He succeeds the late J. Phillips Cosgrove in all three positions. Mr. Cosgrove died last December.

Tom Slick on Dresser Board

Tom Slick was elected to the board of directors of Dresser Industries, Inc., Dallas. Mr. Slick is also a director of Slick Airways, Inc., Southern Equipment Company, National Bank of Commerce of San Antonio, Hewgley Drilling Company, Stanford Research Institute of Palo Alto, Worcester Foundation of Experimental Biology and the San Antonio Chamber of Commerce.

W. S. ANDREWS has been promoted to New York district sales manager for Rockwell Manufacturing Co.

GEORGE BALDWIN transfers to mid-Eastern division of Geo. D. Roper Corp., as manager in western New York, Ohio and parts of West Virginia and Kentucky.

STANLEY C. BERNHARDT joins The Stiglitz Corp., Louisville, Ky., as vice president.

THOMAS L. BLOSE has joined A. O. Smith Corp. of Texas as chief engineer of the company's Houston pipe mill.

HARRY BOOTH joined Los Angeles staff of Geo. D. Roper Corp.

C. I. CARLSON is new manager of gas operations, Susquehanna division, Scranton-Spring Brook Water Service Co., and will be in Williamsport, Pa., office.

PAUL R. COPELAND, JR., has been appointed advertising and sales promotion manager, Home Appliance division, The Murray Corporation of America, Scranton, Pa.

JOHN K. FARRAR is acting sales manager of Mor-Sun Furnace division, Morrison Steel Products, Inc., Buffalo.

R. F. HAMMACK is new Texas-New Mexico division manager of Geo. D. Roper Corp., in Dallas office.

EDWIN E. HAWLEY has joined Pacific Gas Corp., San Francisco, as vice president and general manager of Western division.

CHARLES V. HOEY was promoted to assistant personnel director, The Peoples Natural Gas Co., Pittsburgh.

JOHN W. HUBBARD will supervise building activities for Chemical Plants division, Blaw-Knox Co., from Tulsa office.

GEORGE KARNOFSKY has been appointed assistant to director of research, Chemical Plants division, Blaw-Knox Co., Pittsburgh.

T. H. KENDALL has advanced to assistant vice president in charge of operations, Equitable Gas Co., Pittsburgh.

DOUGLAS R. KRAMER has been appointed advertising manager of American Meter Co.

HERBERT MORGAN, JR., is new district superintendent of construction, Chemical Plants division, Blaw-Knox Co., in Pittsburgh office.

RICHARD J. MURDY has been appointed chief geologist, New York State Natural Gas Corp., Pittsburgh.

TIMOTHY E. O'CONNOR has been transferred to Los Angeles office of Geo. D. Roper Corp. and will train service managers and staffs of Roper retailers.

C. E. PARSON has been promoted to advertising manager of Chambers Corp., Shelbyville, Ind.

W. POWELL, JR., has been promoted to manager of Buffalo branch office of Bailey Meter Co.

ELLIOTT H. POWERS has been elected vice president in charge of exploration, Southern Production Co., Inc., Shreveport, La.

ELLSWORTH G. REYNOLDS has been named an assistant secretary of Michigan Consolidated Gas Co., Detroit.

EUGENE R. SEIFERT has been promoted to land agent for New York State Natural Gas Corp., and will be in Pittsburgh office.

LEO SHIBLEY is now San Francisco division manager of Geo. D. Roper Corp., for northern California, Washington and Oregon.

J. C. TOOKE is new district superintendent of construction, Chemical Plants division, Blaw-Knox Co., in Pittsburgh office.

HAROLD TWITTY has joined Temco, Inc., Nashville, Tenn., as advertising manager.

PIERRE VINET, JR., is new Midwestern division service manager for Geo. D. Roper Corp., based in Kansas City, Mo.

WILLIAM W. WEILL is new Geo. D. Roper Corp. representative among dealers and utilities in Philadelphia area.

News of the Gas Industry

Henry Tuttle is MichCon President

Henry Tuttle

ELECTION OF HENRY TUTTLE as president of Michigan Consolidated Gas Company was announced by the board of directors following the annual stockholders' meeting.

Mr. Tuttle has been employed by the gas company for 32 years. He has been executive vice president since 1949.

The new president went to work first as a service man in the shop department. In 1921 he transferred to the accounting department as a clerk. He held various positions in that department until 1937 when he became first assistant treasurer and assistant secretary of the Company. He was elected vice president and controller of Michigan Consolidated in 1940 and vice president and treasurer in August, 1945.

In addition to his positions with Michigan Consolidated, Mr. Tuttle has served as vice president, secretary and treasurer of its parent, the American Natural Gas Company of which he is now a member of the board of directors.

Mr. Tuttle played a major role in the construction of a new natural gas pipe line which has more than doubled the gas sales of Michigan Consolidated and provide gas for 175,000 additional heating customers.

Mr. Henry Fink, former president of Michigan Consolidated, was elected chairman of the board of directors.

Mr. William G. Woolfolk, former president and chairman, was chosen as chairman of the Executive Committee. Mr. Fink and Mr. Tuttle were also named members of the Committee.

Brockton-Taunton Merger Ready

THE MERGER of Taunton Light Co. with Brockton Gas Light Co., both in Massachusetts, came closer following approval of the plans by the state department of public utilities late last month. Only routine technicalities remain. The merged company will be known as the Brockton Taunton Gas Company.

There will be no immediate changes in the operations of either company, and neither employees nor customers will be affected, R. E. Trower, treasurer of the Brockton company, said.

The officers and directors of the Brockton Taunton Gas Company will be: Rockwell C. Tenney, chairman of the board and director; Issac S. Hall, president and director; Charles H. Tenney II, assistant to the president and director; Frank S. Clifford, vice president and director; Anthony D. Matarese, vice president, general manager and director; Ralph E. Trower, treasurer. Also directors will be: Francis J. Bassett, E. Holbrook Bradley, William M. Hickey, Albert W. Leavitt, Fremont L. Lovett, John C. Willis.

The merged company will serve approximately 53,000 customers in 34 cities and towns covering an area of nearly 800 square miles.

The company will also supply gas to the Norwood Gas Company, North Attleboro Gas Co. and the Gas and Electric department of the town of Middleboro.

Taunton Gas Light Company, merged with Attleboro Gas Light Company Corporation in 1950, was organized 99 years ago.

Brockton Gas Light Co. began operations as the North Bridgewater Gas Light Co. about 1859, and in 1882 it was changed to the present company name.

Conversion of the Brockton area to natural gas is scheduled for this Fall, with Taunton to follow. Lines of the two companies come close together at several points, which should be advantageous in natural gas distribution problems. Both the Brockton and Taunton plants will, it is expected, be retained as stand-by facilities to meet peak demands.

Carson Leaves Northern Natural

NORTHERN NATURAL GAS COMPANY announces that Hiram J. Carson has, at his request, been granted a leave of absence and has resigned his position as first vice president and director of Northern and as director of the subsidiary company, Peoples Natural Gas Company. The leave of absence will be effective until December 1952, Mr. Carson's normal retirement date.

He has been in the electric and gas industry since 1911, first as a cadet engineer with Peoples Light Company of Davenport, Ia., then in Muscatine, Ia., where he became general superintendent of the Gas and Electric Company. Later he became general manager of the Cedar Rapids Gas Co., and upon his return from World War I resumed that position.

Mr. Carson joined Northern Natural in 1930, and has had general supervision of the development of the system from a capacity of about 80 million cubic feet to the present 675 million. He was chairman of the rate and engineering committees and served as chief engineer, superintendent of operations, vice president in charge of operations and as first vice president.

Mr. Carson is known for his work in the fields of dehydration, hydrogen sulphide removal and the all-welded large diameter pipeline.

Last fall he received the American Gas Association Distinguished Service Award for his contributions toward the advancement of the natural gas industry. Mr. Carson has been president of the Midwest Gas Association; chairman, Midwest Natural Gas Supply Committee, War Production Board; chairman, AGA Transmission Committee; chairman, AGA Nitrogen Removal Committee; member, AGA Technical and Research Committee.

Abundant Gas Reserves NPC Says

REASONABLE ECONOMIC INCENTIVES and adequate supplies of materials were the only conditions placed on the outlook for an increasing supply of natural gas and oil in the United States by the National Petroleum Council in its report late last month on productive capacity prepared at the request of the oil and gas division of the United States Department of the Interior.

The council said actual production of natural gas in 1950 was 6.9 trillion cubic feet and the range of availability in 1955 is expected to be between 9.5 and 12 trillion.

"The report," the council said, ". . . concludes that abundant supplies of crude oil and natural gas may be counted upon for the forseeable future granted continuation of reasonable economic incentives and adequate supplies of materials . . . available supplies of oil and gas in the United States and the world are greater than ever before and are still increasing rapidly."

CCNY Sales Courses Overflow

AN OVERFLOW-REGISTRATION for the gas appliance sales course started last week by the City College of New York has brought about the scheduling of additional courses for later in the Spring. [See AMERICAN GAS JOURNAL, February 1952, page 45.]

Dealers and salesmen who could not be accommodated have been assured that further classes will be conducted after the current pilot program has been completed. Classes are limited to 30 students.

Two groups of 30 each are meeting now, one in Newark, N. J. and the other in Brooklyn. One utility company in upstate New York is said to have indicated that it will subscribe to the course for its 200 employees and dealers.

Southwestern Course Dates Changed

THE SOUTHWESTERN GAS MEASUREMENT Short Course dates, previously announced for April 8-through-10, have been changed to May 27-through-29 due to a conflict with Navy-occupancy of housing facilities at the University of Oklahoma, Norman, Okla.

Two Fellowships Offered through Case

FELLOWSHIPS OFFERED THROUGH Case Institute of Technology, Cleveland, to men interested in heating, air conditioning and the related technical fields have been established by Bryant Heater division of Affiliated Gas Equipment, Inc., and F. W. Wakefield Brass Company, Vermillion, O.

Combustion, corrosion, heat transfer, fluid flow and other problems of interest to the gas industry will be matters for research under the Bryant Fellowship. The stipend will be $2,650 for one full year of study.

The Wakefield Fellowship is for research in thermal environment and involves a thesis covering some phase of air conditioning or radiation. The stipend is also $2,650.

Awards will be made after April first.

The Columbia Gas System's Business Is Everybody's Business

That's why we're showing you here a page from our new Annual Report

You can find full details for last year's operations in our 1951 Annual Report. Write The Columbia Gas System, Inc., 120 East 41st Street, New York 17, New York

HIGHER RATES ARE INEVITABLE

This is just another way of saying that public utility rates have no special immunity from the economic laws governing wages and prices in general industry.

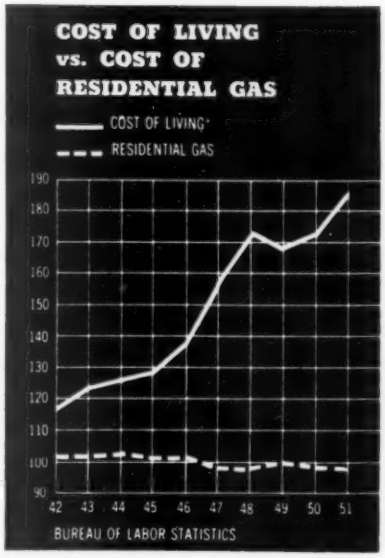
Until recently, Columbia's earnings have continued reasonably satisfactory because of the constant increase in the volume of sales. But now, despite increased operating efficiencies, rising costs of doing business and increased taxes have caught up to us.

The cost of everything we buy—just like the cost of your everyday living—is far higher now than in 1941.

Yet, the cost of gas to our domestic customer has not changed much in all those 10 years.

Look at the chart!

Our customers certainly must appreciate that higher gas rates are inevitable.



If we are to continue high quality service to our customers; if we are to satisfy the demands for more and more gas, we must earn more money. Not enough to put our bills to our customers up to the inflated level of other "cost of living" expenses. But enough so we can meet our obligations as a public service company and protect the investments of our stockholders.

This is the gist of the story we are telling in full detail to the Public Service Commissions which regulate our rates.

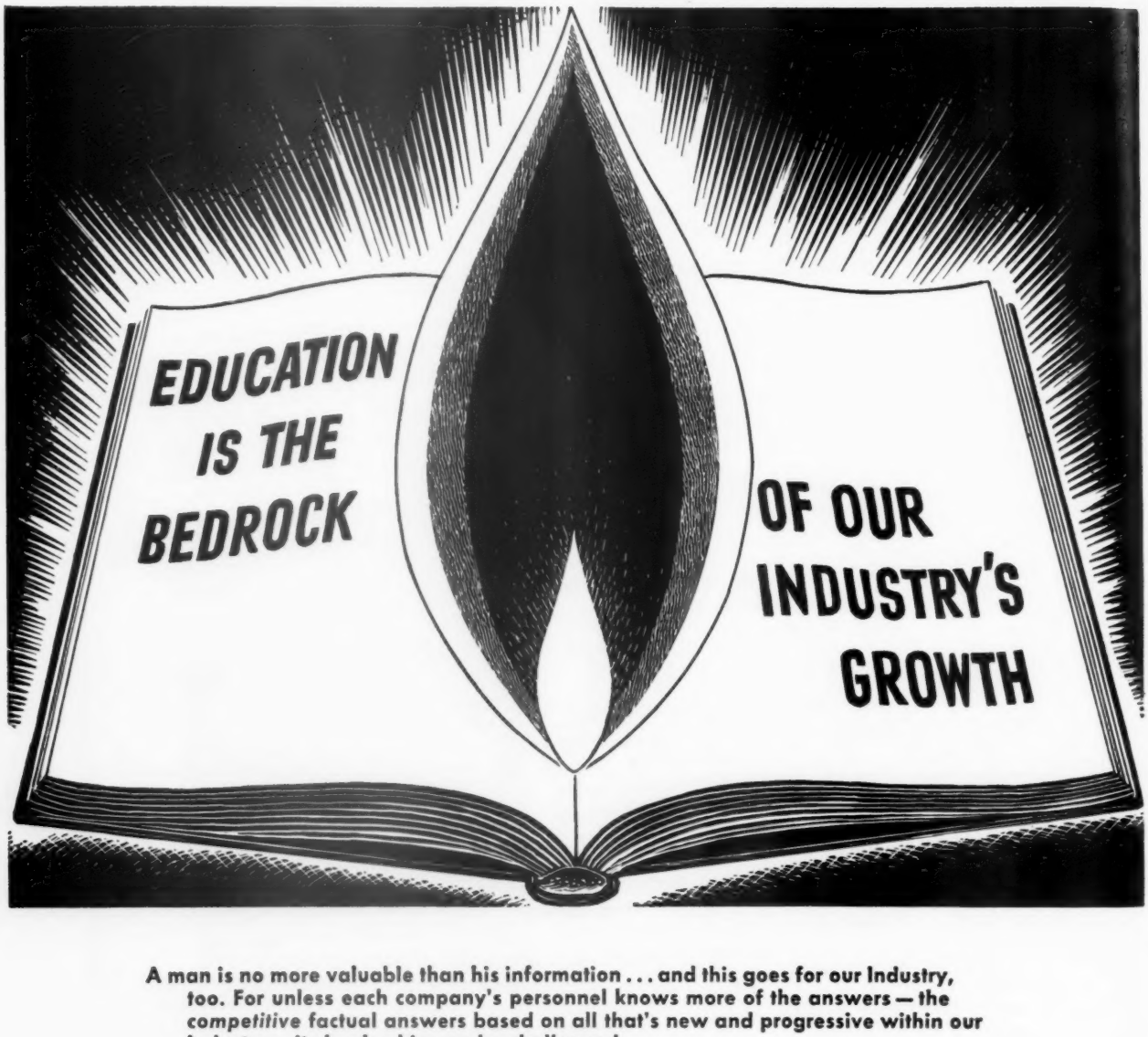
We hope that our customers, many of whom are also our stockholders—or, if not ours, stockholders in other public service companies who face the identical problem, realize that higher utility rates are inevitable.

	1951		1950		1949	
	Total	Per Share*	Total	Per Share*	Total	Per Share*
Earnings before taxes	$39,560,932	$2.65	$37,107,503	$2.51	$24,389,467	$1.74
Taxes	22,234,843	1.49	19,579,619**	1.32	12,169,731	0.87
Earnings available to common stockholders	$17,326,089	$1.16	$17,527,884	$1.19	$12,219,736	$0.87

* Based on average number of shares outstanding.
** Includes "special charges" of $3,178,000.

THE COLUMBIA GAS SYSTEM

CHARLESTON GROUP: United Fuel Gas Company, Atlantic Seaboard Corporation, Amere Gas Utilities Company, Virginia Gas Distribution Corporation, Virginia Gas Transmission Corporation, Big Marsh Oil Company, Central Kentucky Natural Gas Company; **COLUMBUS GROUP:** The Ohio Fuel Gas Company; **PITTSBURGH GROUP:** The Manufacturers Light and Heat Company, Binghampton Gas Works, Cumberland and Allegheny Gas Company, Home Gas Company, The Keystone Gas Company, Inc., Natural Gas Company of West Virginia; **OIL GROUP:** The Preston Oil Company.



A man is no more valuable than his information . . . and this goes for our Industry, too. For unless each company's personnel knows more of the answers — the *competitive* factual answers based on all that's new and progressive within our Industry — its leadership can be challenged.

Informed personnel opinion . . . based on first-hand discussions with our Industry's first-rate leaders . . . is worth its weight in gold — to you, and to the men you are training to hold important key positions.

Invest in your PERSONNEL! Send more of them to your Industry's convention and exposition

Here, under one roof, will be assembled a display of the finest appliances, machinery and methods. Here the keenest minds will discuss the outstanding problems confronting our Industry today. Here *is* the Gas Industry in all its might and glory . . . a source of inspiration and education for all.

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OCT 27-31, 1952
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GAS APPLIANCE MANUFACTURERS ASSOCIATION, INC.
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Dale E. Doty Nominated to FPC

DALE E. DOTY has been nominated by the President to be a member of the Federal Power Commission. He will serve out the term left vacant when Mon C. Wallgren resigned last fall. His term will expire June 22, 1954. Doty, Assistant Secretary of the Interior since June, 1950, is a native of California and lists Pasadena as his residence. He is a lawyer.

Mr. Doty entered Federal service in March, 1939, as a field aide of the Department of the Interior at the United Pueblo Indian Agency in Albuquerque, New Mexico. That year he was transferred to Washington and has been with the department since that time. He was made a special assistant to the Undersecretary in July, 1946. Since June, 1950, he has been Assistant Secretary for Public Land Management with the following bureaus under his supervision: Land Management, Indian Affairs, National Park Service, Fish and Wildlife Service, and Office of Territories.

Information about Mr. Doty did not indicate previous experience with public utilities or the gas industry.

El Paso Natural to Raise $20,000,000

EL PASO NATURAL GAS CO. plans to raise $20,000,000 of "new money" for expansion. Half will be obtained from a public sale through underwriters of 100,000 shares of cumulative preferred stock; the other half will come from an offering to stockholders of 100,000 shares of convertible second preferred stock. Both offerings will be made early this month, it is expected, with the convertible issue going to stockholders of record March 3. El Paso plans expansion of its pipeline capacity to California utilities by 300 million cubic feet daily. Application for this expansion is before the Federal Power Commission.

Bill Provides for Line Relocation Costs

THE FEDERAL GOVERNMENT would be required to bear the costs of relocating natural gas pipelines when necessary in connection with the construction of highways financed through Federal aid grants, if Bill S. 2585, introduced by Sen. McKellar (D. Tenn.) is enacted.

The bill, in the form of an amendment to the Federal Highway Act of 1944, would provide for gas, power and telephone lines the same benefits that are being granted to railroads.

TETCO-TGT to Swap Emergency Gas

THE FEDERAL POWER COMMISSION has approved a plan for exchange of natural gas during temporary periods of emergency on the systems of Texas Eastern Transmission Corporation and Transcontinental Gas Pipe Line Corporation.

Texas Eastern will construct interconnecting and metering equipment at a point where the two main transmission lines cross, near Beaumont, Tex. The interconnection will permit the exchange of 60 million cubic feet of gas per day.

The two companies were authorized to make emergency deliveries to Philadelphia Electric Company and the Philadelphia Gas Works Company, and Public Service Electric and Gas Company (New Jersey). The three companies now receive natural gas from both Texas Eastern and Transcontinental. In times of emergency on either system, gas will be delivered to these consumers for the company experiencing the emergency.

NatGas Causes ConEd to Test Meters

GAS METERS in Westchester county, New York, that operated properly with manufactured gas now are occasionally registering incorrectly for natural gas, the Consolidated Edison Company reported recently.

In a test of 8,272 meters, company engineers discovered that 26 per cent were too fast and had caused overcharges. Some were running too slow, resulting in a loss to the company. Natural gas, which reached Westchester a year ago, being dryer than manufactured gas, resulted in leather diaphragms of old meters becoming too dry and not functioning correctly, so diaphragms of synthetic materials will be used exclusively to combat shrinkage and other defects of leather. The first tests have been confined to large meters used in homes that heat with gas and in factories and institutions.

Of the 8,272 meters tested, 2,169 were running faster than the "98 to 102 per cent of true" required by the state's Public Service Commission. Since last autumn only straight natural gas has been distributed in Westchester. ConEd engineers said that 180,000 meters in the county must be tested and, as necessary, be changed to new diaphragms and other improvements.

TexGasTrans to Build 400-Mile Line

TEXAS GAS TRANSMISSION CORPORATION is prepared to build and place in operation by November, a 400 mile 26-inch pipeline that will carry more gas to midwestern and Appalachian markets, H. L. Stowers, chief engineer, told a Federal Power Commission hearing late last month. The company has received necessary steel allocation from the Petroleum Administration for Defense and has on firm order the steel and other critical materials needed for the project.

Texas Gas has asked the Federal Power Commission for authority to build the $33,572,705 pipeline from Bastrop, Louisiana, to a point near Louisville, Kentucky.

The new pipe line, which will extend in six sections will enable the company to increase its deliveries by 240 million cubic feet of gas a day to residential and industrial consumers in Arkansas, Tennessee, Kentucky, Indiana, Illinois, Ohio, and the Appalachian region. This expansion would raise the system capacity to approximately 950 million cubic feet.

Canadian Association Meeting in June

THE 45TH ANNUAL MEETING and convention of Canadian Gas Association will be held at the Chateau Frontenac, Quebec City, Sunday, June 8, to Thursday, June 12.

Plans provide for registration and group discussion, Monday; opening session and annual golf tournament, Tuesday; business sessions and annual dinner, Wednesday; group discussions, Thursday.

NatGas Increase Kings County Cost

CONVERSION FROM MANUFACTURED GAS to natural gas by the Kings County Lighting Co., New York, will result in increased costs and lower net income this year, according to testimony given at a hearing before the New York Public Service Commission. The commission will determine whether a two per cent decrease from the former rate for manufactured gas, agreed to by the corporation, will yield a fair return for the investors. Examiner Ernest A. Bamman, adjourned the hearing to mid-March.

Affiliated Gas Has $35,000,000 Backlog

AFFILIATED GAS EQUIPMENT, INC. had a backlog of defense contracts at the close of 1951 approximating $35,000,000, Lyle C. Harvey, president, said in the company's annual report. A slump in civilian goods demand early in 1951 and delays in getting into defense production were reflected in a lower 1951 sales volume.

Heaters Down, Conversions Up—GAMA

GAS-FIRED central heating equipment including 2,900 boilers, 22,600 furnaces and 10,700 conversion burners was shipped in January, according to the estimates of Edward R. Martin, director of marketing and statistics, Gas Appliance Manufacturers Association. In December 1951, the shipments were 3,400, 25,700, and 11,300 units, respectively.

Shipments of domestic gas ranges totaled approximately 153,600 units in January. In December, shipments were approximately 145,800 units.

Glenn R. Chamberlain

Glenn R. Chamberlain, 74, first vice president of Michigan Consolidated Gas Co., died January 21, in Grand Rapids.

A native of Grand Rapids, Mr. Chamberlain entered the employment of Grand Rapids Gas Light Co. on Feb. 1, 1897.

He remained in the gas utility field all of his business life, serving as president and general manager of the Grand Rapids Gas Light Co.; president, general manager and organizer of the Kent County Gas Light Co., and first vice president, director and member of the executive committee of Michigan Consolidated Gas Co., with which the two local companies were merged.

In May 1949 he was elected president of the Milwaukee Gas Light Co.

In the period of change-over from manufactured to natural gas, Mr. Chamberlain became president of American Natural Pipe Line Company, president of the Austin Field Pipe Line Company and director of the Michigan-Wisconsin Pipe Line Co.

Louis E. Fischer

Louis E. Fischer, 75, chairman of the board of directors, Kansas-Nebraska Natural Gas Company, died February 15.

Mr. Fischer established the Kansas Pipe Line and Gas Company at Phillipsburg, Kans., in 1936 to pioneer natural gas service to small communities in north central Kansas and south central Nebraska. ➔

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Commonwealth's skilled and experienced staff is available on call to assist you in these and other phases of your gas operations. Over a period of many years we have supplied successful and satisfactory services to manufactured, L-P and natural gas companies ranging in size from only a few meters to hundreds of thousands. Services covering such problems as:

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Property acquisition reports
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Emergency, standby and peak-shaving supply studies
Distribution layout or revamping to meet growing loads
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Conversions

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Jackson, Michigan *Washington, D.C.*

Previous to establishing the Kansas Pipe Line and Gas Company he has helped organize the Northern Natural Gas Company at Omaha. He directed the construction of its original pipeline from Texas to Minnesota and later became president of the company. He had also served as operating vice president of the North American Light and Power Company.

William Naile

William Naile, president, Lebanon (Pa.) Valley Gas Company died on February 4, at the age of 63.

Mr. Naile had been associated with The United Gas Improvement Company and its system companies since July 1907. In May 1909, he was transferred to Ardmore, with the Merion and Radnor Gas and Electric Company as engineering assistant, and later with the Counties Gas and Electric Company as main and service foreman. From November 1913, to April 1927, he was with Consumers Gas Company, Reading, as superintendent of distribution and later as superintendent of production. He returned to the headquarters office of The United Gas Improvement Company as distribution engineer. He remained in Philadelphia until February 1938, when he became president of the Lebanon Valley Gas Company.

Charles A. Conard

Charles A. Conard, an executive in The Philadelphia Gas Works Company until his retirement in 1946, died suddenly in St. Petersburg, Florida, on February 14th. During his 48 years of service with the gas utility, Mr. Conard served in many executive capacities, most recently as manager of the Spring Garden district, manager of the credit and collection division and finally manager of the meter reading division.

Walton Forstall

Walton Forstall, eighty-two, retired vice-president of the Philadelphia Gas Works Co. and a former vice-president of Franklin Institute in Philadelphia, died in Pittsburgh, March 2, at the home of his son, Charles Forstall.

Mr. Forstall started working for the gas works in 1898 and remained with the company until his retirement in 1936.

Surviving, besides his son, are his wife, Mrs. Nina Price Forstall; two other sons, Edward L. and Walton Forstall jr.; a daughter, Mrs. Anne Crowe, and a brother, Alfred Forstall.

Morris E. Leeds

Morris E. Leeds, founder and chairman of the board of Leeds & Northrup Co., makers of electrical instruments, automatic controls and furnaces, died Friday night Feb. 8 at Lake Wales, Fla. He was 82, and had been ill for several weeks.

Charles D. Greason

Charles D. Greason, advertising and publicity director of Gas Service Company, Kansas City, died February 1 at the age of 49. He had been with the utility since 1926; held the post of advertising and publicity director since 1929 and was a member of the board of directors.

The Gas Company's utilization of natural gas can be of great benefit to company and customer alike — but brings with it many new problems. First and foremost is *plant standby capacity* for present and future loads.

The Gas Machinery Company has been the pioneer in study and solution of this problem and offers a wide choice of processes and equipment —

- Low Cost Conversion of Existing Water Gas Sets to Hi-Btu Oil Gas
- Other Oil Gas Methods for Standby and Peak Shaving, Efficiently Designed For Light or Heavy Oil
- Designs for New Oil Gas Generators To Meet Future Load
- Continuous Gas Generator, Utilizing LPG or Gasoline Feeds
- Gas Cooling and Purification
- Oil Scrubbing and Light Oil Recovery
- Auxiliary LPG Systems
- Liquefaction, Storage and Regasification of Natural Gas

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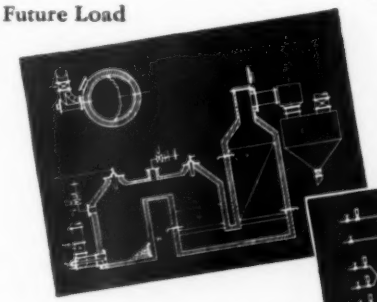

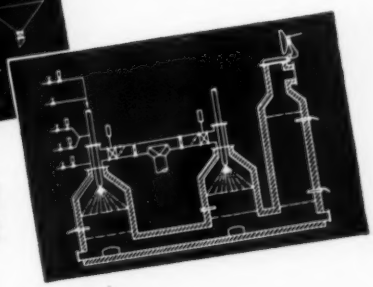

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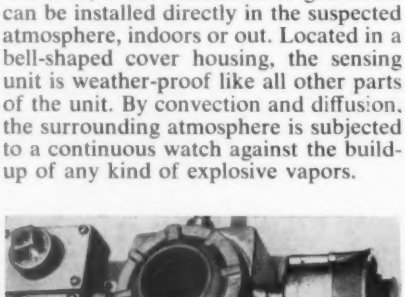
NEW EQUIPMENT

Combustible Gas Alarm

Completely explosion-proof in construction, a new combustible gas alarm can be installed directly in the suspected atmosphere, indoors or out. Located in a bell-shaped cover housing, the sensing unit is weather-proof like all other parts of the unit. By convection and diffusion, the surrounding atmosphere is subjected to a continuous watch against the build-up of any kind of explosive vapors.



Presence of such vapor is signalled by a bright red indicator light as well as by remote alarm units of various types which can be connected to the terminals provided. While the standard alarm point is established at 0.2 of the lower explosive limit, other values can be provided where required. Either self-reset or lock-in arrangements can be provided to give a choice between an on-off indication of gas, or one which must be manually reset. The sensing unit can be located remotely from the rest of the alarm if desired.

Completely a-c operated, the alarm is designed for rough-service locations. It contains no meters or meter-type sensitive relays, but utilizes an electronic trigger-tube circuit to convert the sensing-unit signals into alarm indications. Stand-by power consumption from the 115 volt line is 15 watts.

The alarm is applicable to pipeline pumping stations, liquefied-petroleum gas plants, and industrial and commercial areas where gas or volatile liquids are used, stored, or handled. *Model EE Combustible Gas Alarm.* Johnson-Williams Ltd., 2669 Third St., Palo Alto, Cal.

New balanced vault cover

Designed for safe and easy operation, opening of this counterbalanced vault or manhole cover is accomplished by combination Key-Handle. Lifting the cover to its vertical, open position is a one-hand job. Counterweights, which also hold the cover in a protective upright position, ease the load. Other features are (1) cover can not slam or drop into vault, (2) cover can be opened from inside by one man, (3) positive tamper proof lock can not be opened from outside without key-handle, (4) counterbalance protrudes less than 6" from wall, (5) 30" square opening, (6) heavy duty cast iron frame and ribbed steel cover machined for accurate fit, (7) rattle proof, (8) oilite bronze bushings in linkage. Applications: valve, meter, transformer, district governor vaults or other underground vaults of municipalities, utitlties, manufacturing plants. Availability 60 days. *Wachs Safety Manhole Cover.* The E. H. Wachs Co., 1527 N. Dayton St., Chicago 22, Ill.

Tube Bender

A new combination tube bender that bends both ½" and ⅝" o.d. copper, aluminum, brass and other soft, thin-wall metal tubing is being offered by The Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago 7, Ill. The bender has a dual 1-size shoe and mandrel which permits bending two different sizes of tubing without changing parts. It is of two 1-piece steel and aluminum construction; comes apart to slip over tubing where bends are needed. It can be used where one end is connected. Bends can be made at any angle to 180°. The bender is calibrated to show degree position. Overall length is 21", and weight is 3 lbs. Catalog No. 362-F, described in manufacturer's Bulletin No. 3001. The Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago 7, Ill.

Thermostat Control

This new product is described as a combination timer-heater powered by a Telechron fractional horsepower motor, operating from 110 volt A.C. 60 cycle wall outlets, through attached 6′ cord. All working units are enclosed in a plastic case, finished in simulated satin-brass. It is reported that no rewiring of thermostats,

(Continued on page 41)

NEW BOOKS

FLUID FLOW IN PIPES. By Clifford H. McClain. This is an introduction or refresher covering the mechanics and dimensions of gas and liquid flow in pipes and ducts. Fundamental physical processes are explained in simple language, and the dimensions used in various systems of calculation are clarified. Properties of fluids affecting flow are discussed with illustrations of their influences. Theory, measurement and dimensions of viscosity, relationships between measurement methods, are explained; derivation calculations are included. Friction and energy balance problems involving turbulence and streamline flow are solved. Emperical formulas in flow calculations are presented with discussion of the physical basis.

Applications of principles to piping and duct work are presented with calculations. This book presents the theory and practice of fluid flow in pipes from the dimensional viewpoint. 128 pp., 18 illus., 9 tables. The Industrial Press, 148 Lafayette St., New York 13, N. Y. $3.00.

BUTANE-PROPANE POWER MANUAL. Carl Abell, editor. Step-by-step directions are given for converting gasoline engines to butaine-propane carburetion, including principles, equipment, tools needed and sales hints for getting this business. Six sections and 23 chapters cover fuel and power, carburetion, conversion, service adjustments, maintenance and trouble shooting, how to sell LP gas carburetion. Photographs, diagrams and engineering drawings make it easy to follow the instruction.

Designed for on-the-job use by mechanics and servicemen, a referenced cross-index is included. It is bound in flexible plastic; coat pocket size. 330 pp. Butane-Propane News, 198 S. Alvarado St., Los Angeles 4, Cal. $3.50, postpaid.

NEW BULLETINS

CAM PROGRAMMER THERMOMETERS. Time-temperature control is the subject of this new bulletin, which describes and illustrates the uses, advantages and techniques of this new instrument. A partial list of applications is given: annealing, concrete block curing, retort cooking, size cooking and vulcanizing. Catalog 6020. 16 pp. Minneapolis-Honeywell Regulator Co., Station 40, Philadelphia 44, Pa.

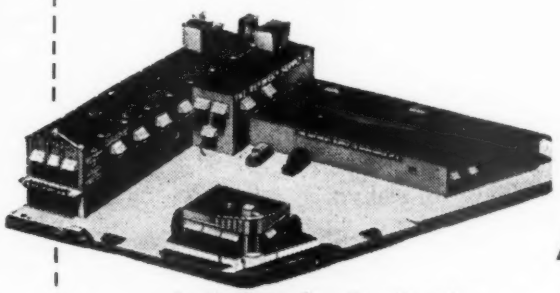
THERMOSWITCH THERMAL CONTROLS. The design, operating characteristics and installation of a thermostatic device are described in a new catalog. Selection and application information is included. Fully illustrated, the catalog includes dimensional drawings and specifications together with typical applications. Catalog No. 400. 52 pp. Fenwal, Inc., Ashland, Mass.

INSTRUMENTS FOR SCIENCE AND INDUSTRY. Slack tube manometers, magnehelic, air filter, hook and smoke gauges are described and illustrated together with tables of their operational ranges. Types of gauges included are combustion, draft, pressure, vacuum, pressure differential, flow, static pressure, velocity, CO_2, smoke and temperature. 12 pp. F. W. Dwyer Mfg. Co., 317 S. Western Ave., Chicago 12.

PROTECTIVE COATINGS. A line of special purpose coatings, for protection of metals, masonry and wood against acids, abrasion, water, oils, high temperature, solvents and weather is described in this new bulletin. 8 pp. David E. Long Corp., 220 East 42 St., New York 17.

INDICATING AND RECORDING FLUE GAS ANALYZER. This bulletin describes the Davis indicating and recording flue gas analyzer which utilizes a thermal conductivity gas analyzer in combination with a Brown ElectroniK recorder. The combined apparatus provides continuous recorded combustion analysis. Data Sheet 10.15-3a. 4 pp. Minneapolis-Honeywell Regulator Co., Station 40, Philadelphia 44, Pa.

AIR-OPERATED BUTTERFLY VALVES. A new bulletin covering the use of Honeywell Air-O-Motor diaphragm operators with Continental butterfly valves. Complete specification data are given for both standard and heavy duty pattern valves. A wide selection of diaphragm operators is shown and described. Catalog 1700. 12 pp. Minneapolis-Honeywell Regulator Co., Station 40, Philadelphia 44, Pa.



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R. S. Pressure Hydrometer Jars
R. S. Vapor Pressure Bomb
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R. S. High Pressure Consistometer
R. S. Smoke Meters

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BS&B 6WDH 10 Glycol Dehydrator

Makes Low Pressure Wells More Profitable

for East Texas Producer

Extra efficiency and operating economy of this BS&B Glycol Dehydrator with compressed gas is paying off in lower dewpoint to the pipeline and more profitable production from the low pressure gas wells in the Gist Field of Newton County, Texas. Handling som 4MMSCFD of natural gas from 6 wells, (compressed to 750 psi) this economical BS&B unit is dehydrating to pipeline requirements. Lower initial cost, minimum operating expense and the fact that compressor oils do not contaminate the dessicant, makes the production and sale of compressed gas both more practical and more profitable with the BS&B Glycol Dehydrator.

For 1MM or 200 MM cubic feet of gas per day, BS&B's WDH Glycol Dehydrators will render the same efficient, economical service. The very simplicity of its controls (with only three standard control parts) and its positive operating cycle make this BS&B unit ideal for wellhead, field or transmission line installation, where trouble-free economical operation and low dewpoint dehydration are the prime factors.

Low Operating Costs. Glycol consumption is negligible with the efficient BS&B WDH dehydrator. The gas-powered Glycol regeneration pump utilizes low pressure gas from the sorber for power; a BS&B patented method.

Write for your FREE copy of the BS&B Gas Dehydrator Book —with complete capacity charts.

EFFICIENCY BS&B RELIABILITY

BLACK, SIVALLS & BRYSON, INC.

Oil & Gas Equipment Division Department 1-B03
2131 Westwood Boulevard, Oklahoma City, Oklahoma

NEW EQUIPMENT

(Continued from page 38)

or major electrical alterations are necessary for installation on the standard thermostat. A one-screw attachment of the timer-heater unit to the thermostat and a plug into the nearest outlet completes the installation. *Heet-O-Matic.* $12.95. Automatic Controls Corp., Ann Arbor, Mich.

Room Circulators

A new 1952 series of circulators with Btu-ratings of 30, 40, 55, and 70,000 has been introduced in modern designs and heat-resistant silicone finish that blend with modern or traditional home furnishings. *Superliners.* Stiglitz Furnace and Foundry Co., Louisville.

Flowmeters

Inaccurate bubble counting and watch timing is said to have been eliminated in a line of new-type flowmeters that give line flow regardless of change in flow rate of gas or air when used in laboratory test work or replacement for sight-feed bubblers. Solid acrylic construction, drilled, reamed and polished to form a sturdy instrument. Standard unit includes a built-in control valve. Special scale ranges are available. Single units or one-piece multiple units for 0-2 cfh to 0-10 cfh at standard conditions are made for front or flush mounting. *Dwyer Flowmeters.* F. W. Dwyer Mfg. Co., 317 S. Western Ave., Chicago 12.

High-Temperature Paint

A new maintenance paint protects metals subjected to temperatures in the range of 200° to 1000° F. and is described as giving durable protection in specific high-temperature applications, including boilers, kilns, exhaust stacks, furnaces, melting pots, refinery equipment and laboratory apparatus. Thermalite is a high-heat aluminum paint. It presents a clean, smooth, silver-bright finish, combining good appearance with high heat resistance. It does not discolor, blister, flake or burn off in temperatures up to 1000° F.

The paint may be applied either indoors or outside, by brush or spray. It dries free from brush marks. A gallon covers up to 1000 sq. ft., according to the manufacturer. *Thermalite.* Tropical Paint and Oil Co., Cleveland, O.

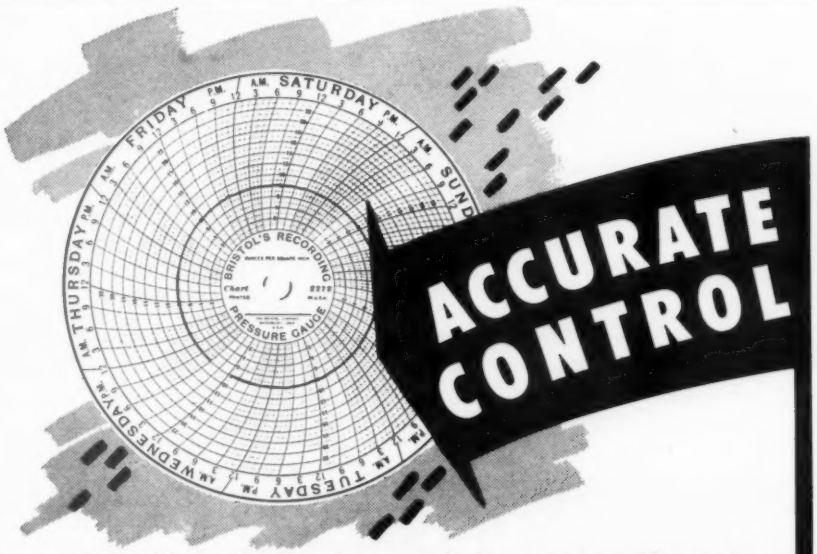
Relief Valve

A new temperature relief valve, automatic reseating type, designed to prevent excessive water temperatures in hot water tanks and heaters, has been announced. It has been tested, rated and listed by AGA for heat input up to 1,200,000 Btu./hr. The design incorporates several engineering developments which, it is claimed provide new accuracy and dependability.

A hermetically sealed thermostatic element containing a chemical mixture of organic and metallic particles expands and contracts in response to variations in temperature. The internal forces of these temperature changes open and close the valve orifice. The valve starts to open at 188°F., and reaches its maximum capacity at 208°F.

By adding a fixture connection to the valve, in addition to the inlet and drain connections, the service flow can be made to pass around the element with every demand for hot water. This assures more rapid and uniform transmission of temperature variations; reduces the lag in temperature.

This new valve is suitable for operating pressures up to 125 lbs. All three connections, inlet, drain and flow, are ¾" tappings. McDonnell & Miller, Inc., 3500 N. Spaulding Ave., Chicago 18, Ill.



Reynolds Service Regulators are built to meet specific requirements — years of operation in the field through a complete range of operating conditions have proved not only their superiority but their durability. With parts so precisely machined for each model that they are completely interchangeable. The accuracy you require in performance is assured.

MODEL 10

Dead Weight or Spring Type, with or without Mercury Seal, or Dead Weight Safety Seal or diaphragm operated relief valve. All working parts are so accessible as to be interchangeable without removal from pipe line.

MODEL 20

Dead Weight or Spring Type, with or without Mercury Seal, or Dead Weight Safety Seal or diaphragm operated relief valve. All working parts are so accurate as to permit complete interchangeability in shop.

MODEL 30

For horizontal or vertical connections, with or without removable valve pocket. Available with either Spring or Dead Weight adjustment. With or without Mercury or Dead Weight Safety Seal or diaphragm operated relief valve.

Reynolds Gas Regulator Co.

ANDERSON, INDIANA, U. S. A.

GAS CONTROL SINCE 1892

Is Cathodic Protection Justified?

(Continued from page 15)

square centimeter of copper exposed to the solution. Second, the current developed by such an electrode is in the wrong direction—copper is cathodic to steel, and any current flowing is being discharged from the pipe.

One thousand ohms per volt is a safe minimum resistance for the meter. The potential will probably be somewhat less than one volt—it is assumed that the instrument is relatively remote from a protective unit—so the current will be less than one milliampere. If it is necessary to use an instrument of much lower resistance than this, it would probably be wise to install a switch in the circuit, to be closed only when taking readings. For those who desire to have a meter reading true potentials, it is suggested that a one-milliampere ammeter be used, with a series resistor added to bring the total circuit resistance up to 1000 ohms. Or a 500 microampere meter may be used (graduated 0-1 volt), with a series resistor to bring the total to 2000 ohms. Corresponding calculations can be made in the case where it is necessary to indicate potentials in excess of one volt.

Operating or maintenance personnel whose duties take them regularly by the location of these instruments should be instructed to read them and record the potential on a regular schedule. They may also be instructed to notify the proper department whenever the reading is below a designated value. *Such notifications should always be promptly acknowledged,* if the continued cooperation of field personnel is to be had. In the absence of any sudden drops, the Corrosion Department should receive and study the daily or weekly readings. Plotting them on charts will be helpful in the observation of seasonal trends, variations with soil moisture, and the gradual failure of coating with time. Such charts should make possible the long-range planning of needed reinforcement of protective measures, while at the same time the voltmeter stands guard to give prompt notice of sudden damage to coating, outage of units, or loss of anodes or cables.

The operator who has a well-coated line under protection with a small unit drawing perhaps two or three amperes, and standing comfortably at 0.95 volt at the lowest point, does not have to worry about whether the coating is holding up —he *knows* that his line is under protection, and he *knows* that his coating is still good.

NYPSC Investigating Gas Safety

THE NEW YORK PUBLIC SERVICE COMMISSION has directed its engineers to conduct a state-wide investigation of the safety of transmission and distribution systems of 44 companies which supply natural, manufactured and mixed gas to New York's 3,700,000 users in homes, businesses and industries.

The investigation is the first of its kind ever made on such a large scale, according to the PSC.

Benjamin F. Feinberg, commission chairman, said the state-wide investigation was ordered as a result of gas explosions last Sept. 21 in Brighton, a suburb of Rochester, in which three persons were killed and 30 injured, and 44 homes either destroyed or badly damaged. A five month inquiry into the Brighton disaster was concluded with the filing of a formal commission report in which Rochester Gas and Electric Corporation, which serves Brighton, was ordered to adopt additional safeguards. The Legislature also was urged in the report to approve measures regulating dynamiting on construction projects near gas mains, and recommendations were made that municipalities adopt ordinances regarding the disturbance of gas lines by construction work in adjacent areas.

Other states and many cities throughout the country have indicated interest in adopting safety orders New York may find necessary, the commission asserted.

[See report of Bureau of Mines investigation, page 45.]

IRON SPONGE

for high efficiency gas purification at high pressures

Iron Sponge is your key to sulfur-free gas at minimum processing cost. Iron Sponge has high efficiency at low pressures or at today's high pressures and high temperatures. It absorbs *more* H_2S, gives long service between foulings, and is easily regenerated. Investigate it for your purification problem today!

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LIGHTWEIGHT MODEL

One Man Operation On Every Application

HIGHLY EFFICIENT

IMMEDIATE SHIPMENT

Free Demonstration and Operating Instructions

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JOSEPH G. POLLARD CO., INC.

Pipe Line Equipment

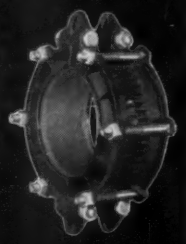
New Hyde Park **New York**

FOR REPAIRING BELL AND SPIGOT JOINT LEAKS...

SKINNER-SEAL
Bell Joint Clamp for stopping bell and spigot joint leaks under pressure. Gasket is completely sealed: at bell face by Monel Metal Seal band—at spigot by hard vulcanized gasket tip.

AND BROKEN MAINS

SKINNER-SEAL
Split Coupling Clamp. One man can install in 5 to 15 minutes. Gasket sealed by Monel band. Tested to 800 lbs. line pressure. A lasting repair. 2" to 16" incl.



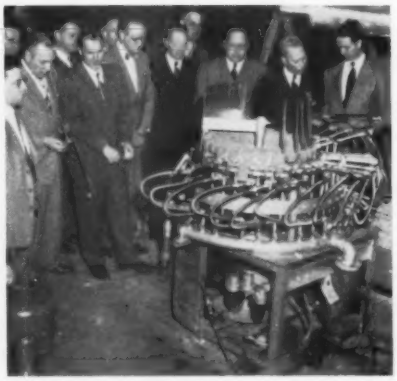
M. B. SKINNER CO.
SOUTH BEND 21, INDIANA, U.S.A.

PhilaElec Representatives Inspect Selas

First-hand information about the development and utilization of gas heating equipment for specific industrial processing was the objective of fifteen Philadelphia Electric Company industrial representatives in their inspection of the laboratories and plant of Selas Corporation of America, heat processing engineers, in Philadelphia on January 30.

Engineers and technicians presented summaries of Selas techniques for applying gas heating to a wide range of industrial materials, with suggestions to the industrial representatives for enhancing their sales efforts by recognition of the tightening requirements for precision in processing and equipment.

Demonstrations in the laboratory illustrated the procedure followed in the development of individualized equipment to meet the specific requirements of industrial gas customers. An inspection of the machine and assembly shops concluded the tour.



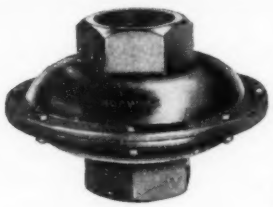
Philadelphia Electric Co. industrial representatives, inspecting Selas plant, see new brazing machine for bicycle forks (left) and laboratory work on high speed industrial heating.

Canadian Dates Changed

The Natural Gas and Petroleum Association of Canada has changed the dates of the 1952 Convention to be held at the General Brock Hotel, Niagara Falls, Ontario, from Thursday and Friday, May 22nd and 23rd, to Thursday and Friday, June 5th and 6th.

1400 Mile Tex-Ill. Radio System

A 1,400-mile microwave radio relay system for the Texas-Illinois pipeline was built by Motorola, Inc., provides voice and other circuits from Hungerford, Texas, to the terminal in Chicago, using beams relayed from tower to tower.



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Eliminate Air In Gas Lines With

NORWALK DIAPHRAGM TYPE CHECK VALVES

Vertical Type in Sizes ⅜" thru 6"
Horizontal Type in Sizes ½" thru 6"

Norwalk Diaphragm Type Check Valves, both Vertical and Horizontal, provide positive check against reverse flow of either gas or air. Rugged construction will stand back pressures to 50 lbs. Soft seat disc will seat freely when gas flows in desired direction or will seat tightly on equalised or back pressure. Valves for higher pressures supplied on special order.

NORWALK VALVE COMPANY
South Norwalk, Conn.

NOW—GEOPHYSICAL PROSPECTING
principals, procedures, and instrumentation

thoroughly explained for more effective petroleum and mineral exploration

THIS book offers in fundamental form information on all standard techniques of geophysical prospecting—understandable guidance for all concerned with the location of petroleum and minerals. Although emphasis is on gravity, magnetic, and seismic techniques, the book also treats electrical and radioactivity prospecting, geophysical methods of well logging, and radio position location. For each method treated, there is a discussion of underlying physical principles, instrumentation, field techniques, and interpretation of field data.

Just Published

INTRODUCTION TO GEOPHYSICAL PROSPECTING

By MILTON B. DOBRIN
Senior Research Technologist, Field Res. Labs., Magnolia Petroleum Co., Dallas, Tex.

435 pages, 265 illustrations, $7.00

Gives facts and data on scores of subjects such as:

- how to determine subsurface structure from gravity data
- quantitative techniques for analyzing magnetic data
- magnetic effect of oil-well casing
- advantages and limitations of aero-magnetic surveying
- effect of drilling fluid in resistivity logging
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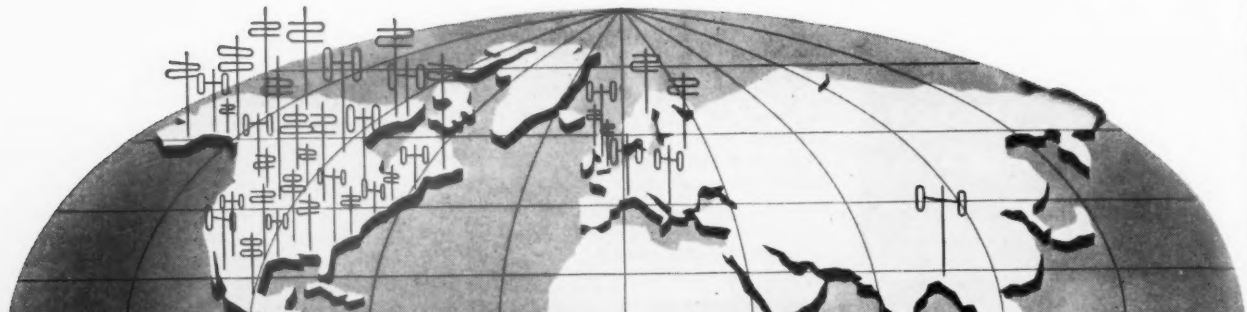
- and many others

AMERICAN GAS JOURNAL, 205 East 42nd St., New York 17



United States 15,700,000 TV Sets

Rest of the World 2,000,000 TV Sets

COMPETITION Turns Luxuries into Necessities

Two millions of people throughout the world, washing machines, radios and television sets are miraculous inventions remote from their lives . . . for the wealthy only.

In the United States, however, a new product appears in no time in the homes of wage earners as well as salaried executives.

Consider television, for example. Only 6,500 sets produced in 1946 . . . over 5,000,000 in 1951. Or washing machines . . . more than 24,000,000 in 10 years.

What has Competition to do with this?

Do you think we'd continue to get more and better products if only one company made each item or each line?

No! We get more and better products here in America, because anybody who thinks he can make anything better or sell it more efficiently is free to try.

And many succeed. Take electrical products like radios and television sets . . . and home appliances like washing machines and electric fans. Does the biggest company monopolize this industry? Not by a long shot! Even counting all its affiliated companies, it still sells less than 1/5 of such products bought in this country.

There are nearly a thousand other companies that make home appliances, radios and television sets. And they do more than 4/5's of the business! The smallest of them make the biggest companies hustle their bones to keep making products better and better.

In America, a better product can always win consumer acceptance in any field.

Let's keep the COMPETITIVE SYSTEM working for us

The Competitive System can be killed! When industries are run by government, when taxes are so high that they destroy the incentive to work hard and risk savings in business ventures, the Competitive System languishes and dies.

You've seen it happen in other lands. Let's not let it happen here.

Let's all of us watch closely to see that those who represent us in government are working with us and for us to preserve our Competitive System; to assure a tax structure that leaves enough incentive to make hard work worthwhile, so that *any* man with ability and energy has a chance to earn good money and keep most of it.

Competition thrives best where the rewards are high. People live best where competition thrives.

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THE COMPETITIVE SYSTEM DELIVERS THE MOST TO THE GREATEST NUMBER OF PEOPLE

Bureau of Mines Investigates and Reports on Rochester Explosion

The U. S. Bureau of Mines was called in by the town of Brighton to make an investigation of the disaster near Rochester, N. Y., on September 21, 1951 [See AMERICAN GAS JOURNAL, Oct. 1951]. A report was made by the Bureau, including eleven recommendations.

The report, largely the same as the report by Frederick J. Pfluke of Rochester Gas and Electric Corporation, was believed to have been made without consulting company engineers.

The Bureau's recommendations, in brief, are:

1. Individual service pressure regulators be provided in existing and future installations. They are to be equipped with pressure release vents discharging gas to the atmosphere.

2. The new release vent on the low pressure side of the pressure regulators, reducing pressure from 5 psig to service line pressure, be maintained and the vent release should operate at not over 50 percent above the normal service pressure.

3. A release vent should be installed on the low pressure side of the regulators that are supplied with gas from the 30 psig main. That vent release should operate at not over 50 percent above the normal pressure to be supplied to that portion of the distribution system.

4. Individual curb shut off valves should be provided on all new installations.

5. The pressure regulator vaults at Twelve Corners [near the scene of the accident] should be provided with adequate means for natural ventilation, or that the vaults be sealed completely to protect against ignition. As an alternative, the vaults should be removed and be situated in a place remote from traffic.

6. Consideration should be given to providing means for rapid and adequate removal of possible gas leakage along the 30-pound pressure natural gas line, or other high pressure gas lines. As water and gas services cross over and above the high pressure gas line, an extensive leakage could readily migrate along these service lines and into buildings.

7. In view of the numerous complaints reported on the performance of gas appliances since conversion to natural gas, it appears that the readjustment of appliances previously used with manufactured gas has not been adequate or satisfactory. It appears desirable where difficulties have been experienced to install new heating elements and pilots approved by AGA Laboratories or other approval agencies rather than trying to make adjustments in equipment designed primarily for manufactured gas.

8. In view of reports that it was difficult, and in instances impossible, to turn off the main gas valves leading to meters in residences, consideration should be given to providing equipment for shutting off the gas should an emergency arise.

9. High and medium pressure regulators should be installed in separate vaults and at a minimum distance of 100 feet apart. It is understood that the Rochester Gas and Electric Corporation has started work on separation of high and medium pressure regulators.

10. Means should be provided for removing dust and dirt from the gas. Reports were received that the natural gas delivered to consumers' gas appliances contained dirt which clogged pilots and other small orifices and made it difficult to maintain satisfactory burner operation.

11. All manhole openings should be provided with well fitting non-ventilated covers; other openings should be sealed to prevent ignition from the street.

47 Firms Testing Texas Gas Tax

THE NEW TEXAS GAS-GATHERING TAX will be tested in Austin, March 17, before Judge Jack Roberts. Attorney General Price Daniel and lawyers who filed 47 cases to recover tax payments will decide later which suits to try first. They hope to get a court decision on all points of dispute.

The Legislature last year passed a tax of 0.45 of one cent per thousand cubic feet on the business of "gathering" gas. This was expected to put $12,000,000 to $14,000,000 annually in the Texas treasury. Most interstate pipe lines and numerous operators within Texas paid the new tax under protest after it went into effect on Sept. 1, and thereby tied up most of the income.

Governor Allan Shivers warned that he would call a special session of the Legislature to levy other taxes if a deficit results from the dispute. The protesting companies claim the new tax is an unconstitutional levy on interstate commerce.

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THE GOODMAN STOPPER

Now has the "Z" handle for easy manipulation. When locked in place it holds. Stopper cannot slip. Gas cannot pass. Adjusted in 30 seconds.

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Nearly a half century of service to the Gas Industry.

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A Complete
MAIN TREATMENT SERVICE

Prepare for Natural Gas

GPM PRODUCTS

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FPC Recommends Wide Changes in Natural Gas Act

TEN RECOMMENDATIONS FOR AMENDMENT of the Natural Gas Act, covering a wide range of important changes, are proposed by the Federal Power Commission in its annual report to Congress.

Security Issue Regulation—Section 11 of the Act to be amended to give the Commission jurisdiction with respect to the approval of security issues of natural gas companies.

Emergency Interconnections—A new subsection (i) be added to section 7 of the Natural Gas Act giving authority to the Commission, similar to that conferred by section 202 of the Federal Power Act, to require natural gas companies to interconnect their facilities to sell or exchange gas, together with authority to prescribe the terms, arrangements, and conditions for such interconnections.

Comprehensive Investigatory Authority—Section 14(a) of the Act be amended to give the Commission broad investigatory powers with respect to the gas industry.

Additional Authority as to Importation and Exportation of Gas—Section 3 of the Act to provide that the same standards applicable to the transportation and sale of natural gas, to the extent applicable, shall be applied to the importation and exportation of natural gas, including authority to regulate rates and service so far as operations within the United States are concerned.

Sales for Resale for Industrial Use Only—Section 4(e) of the Act to be amended to give the Commission full authority to suspend rate schedules covering sales of natural gas for resale for industrial use only. This would require the deletion of the proviso now contained in that section.

Amendments to Section 5(a)—To be amended to provide express authorization for the Commission (1) to increase rates where necessary to correct undue discrimination; and (2) to allocate gas among customers of a natural gas company in periods of shortage.

Various Amendments in Section 7(c)—To be amended (1) to eliminate mandatory hearing requirement, substituting a requirement for due notice and opportunity for hearing; (2) to provide specifically for control by the Commission of the end-use of natural gas when required for national defense or to safeguard the available supply; (3) to require by express language a certificate of interstate facilities for lease or sale to another as operator; and (4) to enlarge the Commission's authority to grant temporary certificates in any emergency situation where no objection to issuance has been filed after due notice.

Amendments to Section 7(b)—To be amended (1) to eliminate mandatory requirements for hearing, substituting a requirement for due notice and opportunity for hearing; (2) to make it clear that the section applies to curtailment as well as abandonment of service; and (3) to require approval for transfer by a natural gas company of natural gas reserves where such reserves constituted part of the bases for previous issuance of certificates.

Amendments to Section 7(f)—To be amended (1) to eliminate the service area provision; and (2) to provide for the enlargement of existing facilities to serve present customers under such rules and conditions as the Commission may prescribe.

Exemptions under Section 16—To be amended to permit the exemption of natural gas companies from requirements of any provisions of the Natural Gas Act on a finding of consistency with the public interest.

Gasification: A New Coal Industry

A NEW COAL INDUSTRY based on "cooking" coal underground was predicted by Jack J. Forbes, director of the United States Bureau of Mines, speaking to the First International Conference on the Underground Gasification of Coal, Birmingham, Ala., last month. The American experiment at Gorgas, Ala., is sponsored by the Bureau of Mines, the Alabama Power Co., University of Alabama, Alabama Polytechnic Institute and Southern Research Institute.

"This Alabama plant is a forerunner of a great industry of the future," Mr. Forbes said. "It will benefit both the coal industry and the nation."

SUPERIOR METERS

RESPECTED BY TWO GENERATIONS OF METER MEN

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ALL SIZES 5B TO 75C

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PARTS—REPAIRS DIAPHRAGMS

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OVER 1,000,000 SUPERIOR METERS ARE OUR BEST SALESMEN

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MORE THAN FORTY-EIGHT YEARS OF SOUND STEEL PLATE CONSTRUCTION

GAS HOLDERS — Gas Holder Repairs

PURIFIERS — Gas Holder Inspection

PAD SUMMARIZES CMP GAS PIPE ALLOCATIONS

TOTAL ALLOCATIONS of 1,564,923 tons of line pipe for gas transmission have been made by the Petroleum Administration for Defense in the first four quarters under the Controlled Materials Plan, Deputy Administrator Bruce K. Brown announced. The period covers the last half of 1951 and the first half of 1952.

In some cases companies have not been able to place their orders for line pipe during the quarter for which the allotment was first made, and have then had to ask PAD for a revalidation of the allotment in a later quarter, it was explained, so that accurate tabulation of such revalidation requests is practically impossible. Consequently, PAD explained, the data in the tabulation are based on the original allotments only and can not reflect the tonnage of pipe actually shipped.

Major PAD Gas Transmission Pipe Allocations

1951		*1952*		
3d Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	Current CMP Total
469,944	460,829	326,650	307,500	1,564,923

Details of the allotments to the larger gas line projects cover projects taking 5,000 tons or more in any single quarter. The projects shown individually account for 56 per cent of the allocations; the remaining 44 per cent having gone to more than 1,200 separate, smaller projects.

Colorado Interstate Gas Co.—loop and extension; 80,000 Mcf/day capacity; cost, $12,281,000; 25,858 tons.

East Ohio Gas Co.—new supplies to marketing area; 294,000 Mcf/day capacity; cost, $6,047,000; 5,504 tons.

El Paso Natural Gas Co.—field facilities, compression and loop; 100,000 Mcf/day capacity; cost, $23,494,000; 9,200 tons.

Houston Pipe Line Co.—85-mile loop; 155,000 Mcf/day capacity; cost, $8,649,000; 16,640 tons.

Lone Star Gas Co.—storage fields to Dallas; 105,000 Mcf/day capacity; cost, $5,796,000; 11,500 tons.

Manufacturers Light & Heat Co.—Clinton, Pa. to Pittsburgh; 105,000 Mcf/day capacity; cost, $9,706,000; 30,814 tons.

Mississippi River Fuel Co.—new supply connection; 50,000 Mcf/day capacity; cost, $5,403,000; 10,000 tons.

Montana Power Co.—Canada to Anaconda Copper Plant, U.S. portion only; 27,500 Mcf/day capacity; cost, $3,602,000; 5,900 tons.

New York State Natural Gas Co.—tie-in storage field; 260,000 Mcf/day capacity; cost, $7,853,000; 5,644 tons.

New York State Natural Gas Co.—Ithaca to Albany, N. Y.; 53,000 Mcf/day capacity; cost, $15,315,000; 13,500 tons.

Northern Natural Gas Co.—125-mile loop; 130,000 Mcf/day capacity; cost, $36,497,000; 15,124 tons.

Southern Counties Gas Co.—loop from storage to market; 100,000 Mcf/day capacity; cost, $2,511,000; 5,390 tons.

Tennessee Gas Transmission Corp.—loop and extension to Massachusetts; 250,000 Mcf/day capacity; cost, $64,540,000; 137,870 tons.

Texas Eastern Transmission Corp.—Kosciusko, Miss. to Connellsville, Pa.; 382,000 Mcf/day capacity; cost, $74,815,000; 194,000 tons.

Texas Gas Transmission Corp.—600-mile of 26" loop and extension; 260,000 Mcf/day capacity; cost, $46,126,000; 85,000 tons.

Texas-Illinois Natural Gas Co.—Corpus Christi to Chicago; 374,000 Mcf/day capacity; cost, $131,323,000; 75,700 tons.

United Gas Pipeline Co.—1,018 miles of 24", 26" and 30" from Texas Gulf Coast to Miss. and La.; 920,000 Mcf/day capacity; cost, $116,500,000; 210,039 tons.

United Gas Pipeline Co.—336 miles of 20", 24" and 30" Refugio Houston-Beaumont, Tex.; 435,000 Mcf/day capacity; cost, $14,380,000; 27,320 tons.

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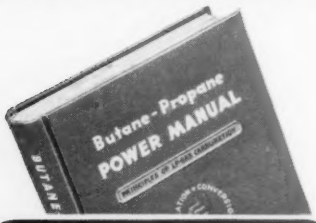

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GAS INDUSTRY CALENDAR

March

27-28 OKLAHOMA UTILITIES ASSOCIATION, Biltmore Hotel, Oklahoma City, Okla.

27-28 NEGA, ANNUAL MEETING, Hotel Statler, Boston, Mass.

31–April 2 MID-WEST GAS ASSOCIATION, ANNUAL MEETING, Hotel Radisson, Minneapolis, Minn.

April

2-3 PCGA TECHNICAL SECTION, TRANSMISSION CONFERENCE, Berkeley, Cal.

3-5 FLORIDA-GEORGIA GAS ASSOCIATION, FLORIDA LPG ASSOCIATION, JOINT MEETING, Soreno Hotel, St. Petersburg, Fla.

4 MARYLAND UTILITIES ASSOCIATION, ANNUAL CONVENTION, Lord Baltimore Hotel, Baltimore, Md.

7-8 EASTERN NATURAL GAS REGIONAL SALES CONFERENCE, RESIDENTIAL SECTION, Hotel William Penn, Pittsburgh, Pa.

7-10 AGA DISTRIBUTION, MOTOR VEHICLES AND CORROSION CONFERENCE, Benjamin Franklin Hotel, Philadelphia, Pa.

15-17 PCGA TECHNICAL SECTION, CUSTOMERS SERVICE, Los Angeles, Cal.

16-18 AGA SALES CONFERENCE, INDUSTRIAL-COMMERCIAL, Netherland Plaza, Cincinnati, O.

17-18 PCGA ACCOUNTING SECTION, Los Angeles, Cal.

21-23 MID-WEST REGIONAL GAS SALES CONFERENCE, Edgewater Beach Hotel, Chicago, Ill.

24-25 INDIANA GAS ASSOCIATION, ANNUAL MEETING, French Lick Springs Hotel, French Lick, Ind.

28-30 SOUTHERN GAS ASSOCIATION, ANNUAL CONVENTION, Galveston, Tex.

May

5-9 AGA COMMERCIAL GAS SCHOOL, Chicago, Ill.

8-9 PUBLIC UTILITIES ADVERTISING ASSOCIATION, Hotel Radisson, Minneapolis, Minn.

12-13 AGA NATURAL GAS DEPARTMENT, SPRING MEETING, Biltmore Hotel, Los Angeles, Cal.

13-15 PENNSYLVANIA GAS ASSOCIATION, Wernersville, Pa.

21-23 GAMA ANNUAL MEETING, The Broadmoor, Colorado Springs, Col.

26-28 AGA PRODUCTION-CHEMICAL CONFERENCE, Hotel New Yorker, New York.

27-28 PCGA COMMERCIAL-INDUSTRIAL SALES CONFERENCE, Los Angeles, Cal.

27-29 SOUTHWESTERN GAS MEASUREMENT SHORT COURSE, University of Oklahoma, Norman, Okla.

June

5-6 AGA RESEARCH-UTILIZATION CONFERENCE, Hotel Statler, Cleveland, O.

8-12 CANADIAN GAS ASSOCIATION, Chateau Frontenac, Quebec City, Canada.

10 PCGA COMMERCIAL-INDUSTRIAL SALES CONFERENCE, Portland, Ore.

16-17 AGA RATE COMMITTEE, Skytop Lodge, Skytop, Pa.

16-22 INTERNATIONAL GAS CONFERENCE, Brussels, Belgium.

23-24 MICHIGAN GAS ASSOCIATION, ANNUAL MEETING, The Grand Hotel, Mackinac Island, Mich.

July

11 NEGA HOME SERVICE GROUP, Boston Gas Company Auditorium.

11 NEGA INDUSTRIAL GROUP, Hotel Kimball, Springfield, Mass.

September

3-5 PCGA, Ambassador Hotel, Los Angeles, Cal.

12 NEW JERSEY GAS ASSOCIATION, Monmouth Hotel, Spring Lake, N. J.

October

27-31 AGA ANNUAL CONVENTION, Atlantic City, N. J.

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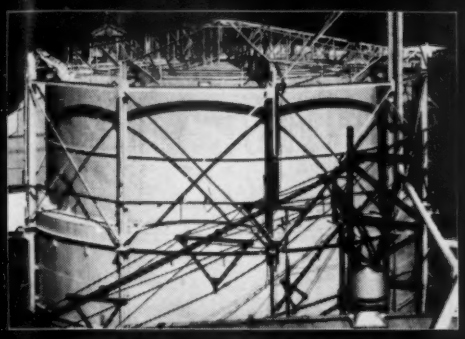

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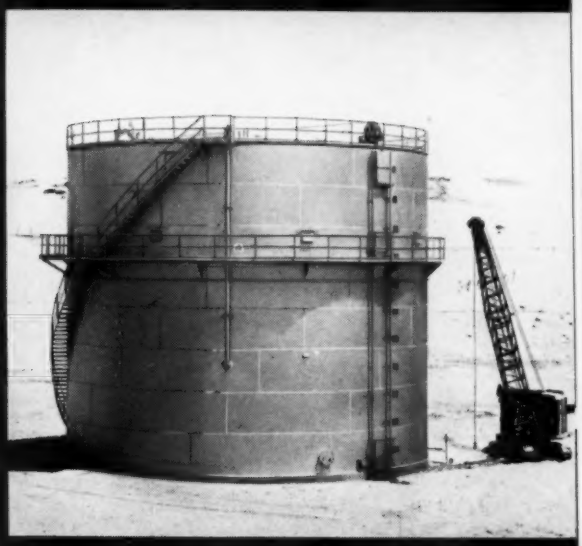

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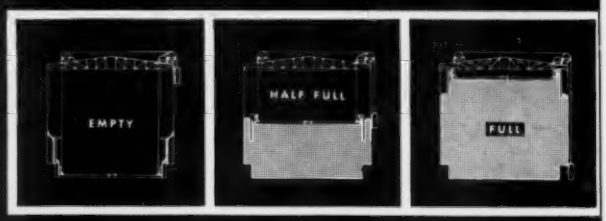

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